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EPIDEMIOLOGY OF NONCOMMUNICABLE DISEASES AND CARDIOMETABOLIC RISK FACTORS IN CENTRAL ASIA: A COMPARATIVE ANALYSIS WITH A FOCUS ON UZBEKISTAN

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ABSTRACT

Background. Noncommunicable diseases (NCDs) account for a large share of premature mortality, and cardiometabolic risk-factor surveillance is particularly relevant for health systems in Central Asia. Objective. To compare the latest harmonized estimates of hypertension prevalence, diagnosis, treatment, and control in five Central Asian countries and contextualize the epidemiological implications for Uzbekistan. Materials and Methods. A descriptive secondary analysis was conducted using the WHO 2025 hypertension country profiles (2024 model-based estimates), WHO NCD surveillance materials, Global Burden of Disease publications, and peer-reviewed regional policy studies available by 14 November 2026. Published aggregate figures were tabulated without access to individual records, inferential reanalysis, or meta-analysis. Results. Estimated hypertension prevalence among adults aged 30–79 years ranged from 37% in Turkmenistan to 47% in Uzbekistan; corresponding control among people with hypertension ranged from 8% in Tajikistan to 34% in Kazakhstan. Uzbekistan had an estimated 8.0 million adults with hypertension, of whom 53% were diagnosed, 43% treated, and 18% controlled. In the WHO profiles, estimated obesity prevalence was 29% (2022), physical inactivity 32% (2022), and mean salt intake 9 g/day (2021). A reconstructed care-state distribution indicated that 47% of affected adults were undiagnosed, 10% diagnosed but untreated, and 25% treated but uncontrolled, using rounded WHO estimates. Conclusion. Central Asia exhibits substantial heterogeneity in detection and treatment success despite a shared cardiometabolic burden. Epidemiological priorities for Uzbekistan include updated population-based surveys, equitable screening, standardized primary-care treatment pathways, and measurable risk-reduction policies. Findings are descriptive and do not establish the effectiveness of any proposed intervention [1–4,12,15].

Keywords: noncommunicable diseases; epidemiology; Central Asia; Uzbekistan; arterial hypertension; cardiometabolic risk; population surveillance; disease prevention; health systems.

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INTRODUCTION

Noncommunicable diseases (NCDs), including cardiovascular disease, malignant neoplasms, chronic respiratory disorders and diabetes, increasingly shape population health and demand sustained prevention and management rather than episodic clinical responses. According to the World Health Organization (WHO), at least 43 million deaths were attributed to NCDs globally in 2021, and approximately 18 million occurred before age 70 years. The disproportionate concentration of premature deaths in low- and middle-income countries makes NCD control both an epidemiological and an equity challenge [1]. Cardiovascular disease contributes the largest share of NCD mortality, and high blood pressure remains one of its major measurable and modifiable determinants [2,12].

The Central Asian countries—Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan—share several historical and health-system characteristics, but differ in urbanization, population structure, availability of preventive services and the implementation of risk-reduction policies. A comparison of disease prevalence alone can obscure these differences: the proportion of affected individuals who receive a diagnosis, start appropriate treatment and attain control may vary substantially at a similar level of physiological risk. Regional health-systems research highlights the importance of primary-care capacity, the financial burden of treatment, the distribution of the health workforce and exposure to environmental and behavioral risks [5,16].

Uzbekistan provides a particularly important case study. The WHO European Observatory reports that NCDs are the dominant cause of mortality and morbidity in the country and that cardiovascular diseases lead mortality in both women and men. Diet, high blood pressure, tobacco exposure and air pollution are identified as important risk factors; expansion of coordinated primary care has been an explicit reform priority [5]. The country has conducted national STEPwise Approach to NCD Risk Factor Surveillance (STEPS) surveys, but survey years and definitions must be distinguished from subsequent model-based WHO estimates [6,11].

The aim of the present article is to produce an original, transparent descriptive comparison of the most recently available harmonized hypertension indicators across Central Asia, describe the associated risk-factor landscape for Uzbekistan, and propose an evidence-informed surveillance and implementation framework. The article does not claim new fieldwork, newly recruited participants, or a validated causal explanation for cross-country variation.

LITERATURE REVIEW

Major international surveillance initiatives provide complementary views of the NCD transition. The NCD Risk Factor Collaboration analyzed 1,201 population-representative studies containing measurements from 104 million participants to characterize hypertension trends between 1990 and 2019; that work established the value of standardized definitions and described pronounced international differences in diagnosis, treatment and control [12]. The Global Burden of Disease (GBD) 2021 comparative risk

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assessment further evaluated 88 behavioral, metabolic and environmental risk factors across 204 countries and territories, demonstrating that avoidable burden should be interpreted across interacting exposures rather than reduced to a single behavioral explanation [13]. A separate GBD-based study estimated 43.8 million NCD deaths in 2021 and emphasized the continuing prominence of cardiovascular and metabolic disease in global disability-adjusted life years (DALYs) [14].

Recent studies have strengthened the relevance of these findings to Asia. Zhang and colleagues analyzed GBD 2021 cardiovascular disease estimates across six Asian regions and reported that the highest age-standardized cardiovascular DALY rate was observed in Central Asia (8,630.7 per 100,000). In their analysis, high systolic blood pressure remained a leading risk contributor, with ambient particulate matter pollution, elevated body mass index, kidney dysfunction and high fasting plasma glucose contributing to a heterogeneous regional profile [15]. Regional comparisons therefore require both disease-outcome indicators and the distribution of upstream exposures. Estimates of obesity, for example, vary by age, reference year, measurement protocol and whether modeled or survey-observed values are considered [17,18].

The WHO Global Report on Hypertension 2025 estimated that approximately 1.4 billion adults aged 30–79 years had hypertension in 2024, with only around 23% achieving control globally. Its country profiles provide a standardized set of age ranges, definitions and care-cascade indicators, facilitating comparative description [2–4]. Importantly, the country-profile methodology projects 2024 estimates using historical trends and population weighting rather than representing new national blood-pressure surveys conducted in 2024. This distinction is crucial for responsible interpretation and should be visible in tables, figures and conclusions [3].

The intervention literature provides a second, implementation-focused strand. WHO HEARTS advocates standardized protocols, accessible medicines, team-based primary care, regular monitoring and risk-based management [9]. Updated WHO “Best Buys” emphasize cost-effective tobacco, alcohol, nutrition and physical-activity measures [8], while the 2025 NCD Progress Monitor documents persistent gaps in national implementation [7]. A 2026 analysis of policy implementation in 12 Eastern European and Central Asian countries found uneven progress in smoke-free regulation, nutrition reformulation, counseling services and the clinical integration of physical activity promotion [16]. Taken together, epidemiological evidence supports an approach that links population risk distributions to measurable service-delivery indicators rather than assuming that publication of a guideline necessarily translates into control of disease.

MATERIALS AND METHODS

A descriptive secondary-data analysis and targeted narrative literature synthesis were conducted for the five sovereign Central Asian countries: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. The principal numerical source was the WHO 2025 hypertension country-profile annex, with its corresponding explanatory notes [3,4]. Additional context was obtained from the WHO Global Report on Hypertension 2025; the

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Uzbekistan STEPS 2019 report (published in 2022) and WHO STEPS metadata repository; the WHO European Observatory Uzbekistan health-system report; the GBD 2021 literature; and the WHO 2024–2025 prevention and implementation guidance [2,5–18]. Publicly available records and publications accessible as of 14 November 2026 were considered. This was a targeted rather than exhaustive systematic search; PRISMA screening, independent dual-reviewer appraisal and formal meta-analysis were not undertaken.

For country comparisons, hypertension was defined in the WHO profiles as systolic blood pressure at least 140 mmHg, diastolic blood pressure at least 90 mmHg, or current antihypertensive medication; model-based estimates apply to adults aged 30–79 years in 2024. The denominator for diagnosis, treatment and control percentages was the population with hypertension, not all adults. Control denotes receiving treatment with blood pressure below 140/90 mmHg. Age ranges and time points for other indicators differ: salt intake applies to adults aged 25 years and older in 2021, while tobacco, obesity and physical inactivity indicators refer to their respective age groups in 2022. The probability of premature death from four major NCD categories between exact ages 30 and 70 corresponds to SDG 3.4.1 and is based on 2021 estimates [3,4].

Published country values were transcribed into a five-country comparative table. A simple descriptive rank comparison was used without population weighting, significance testing, adjustment for age structure beyond the source model, or causal modeling. For Uzbekistan, four mutually exclusive treatment-status categories were calculated arithmetically from WHO rounded aggregate percentages: undiagnosed = 100 − diagnosed; diagnosed but not treated = diagnosed − treated; treated but uncontrolled = treated − controlled; and controlled = the WHO reported control proportion. This reconstructed partition is intended solely to visualize the care cascade; differences between rounded figures may not represent exact underlying counts. Figure and table notes identify sources and denominators to prevent misinterpretation.

No individual-level survey data or identifying medical records were obtained, and no participants were recruited. Accordingly, ethics committee approval and informed consent were not applicable. The analysis is original in its framing, selective comparison and synthesis, but it is not a new population survey or a prospective intervention evaluation.

Table 1. Evidence inputs and interpretation rules used in the secondary synthesis.

Evidence source	Geographic scope	Data period	Main use and interpretive safeguard
WHO 2025 hypertension country profiles [3,4]	Five Central Asian states	2024 modeled	Comparable adult 30–79 prevalence and cascade; projections, not new 2024 field surveys
WHO hypertension/global NCD reports [1,2]	World	2021–2024	Context for global burden; avoid mixing mortality and

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Evidence source	Geographic scope	Data period	Main use and interpretive safeguard
			prevalence denominators
Uzbekistan STEPS and system review [5,6,11]	Uzbekistan	2019 survey; 2024 review	Locally observed risk patterns and service context; age coverage differs
GBD risk/burden analyses [13–15]	Global and Asia	1990–2021	Age-standardized mortality/DALYs; separate modeled burden from WHO prevalence
WHO policy guidance and regional analysis [7–10,16]	Global and EECA	2020–2026	Interpretation of surveillance-to-policy priorities; not efficacy estimates from this study

RESULTS

The published WHO profiles show that hypertension was common in every Central Asian country in 2024, but estimated prevalence and successful control were not distributed uniformly. Uzbekistan had the highest modeled prevalence in this five-country comparison (47%), followed by Tajikistan (44%), Kazakhstan (43%), Kyrgyzstan (40%) and Turkmenistan (37%). The prevalence values exceed the WHO country-profile global reference of 34%; however, comparisons are descriptive and the figures represent model-based population estimates rather than direct, contemporaneous measurements at each location [3,4].

Table 2. Estimated hypertension prevalence and care cascade in Central Asia (WHO profiles, 2024).

Country	HTN prevalence[1] (%)	Diagnosed[2] (%)	Treated[2] (%)	Controlled[2] (%)
Kazakhstan	43	86	74	34
Kyrgyzstan	40	55	41	12
Tajikistan	44	47	32	8
Turkmenistan	37	59	46	12
Uzbekistan	47	53	43	18

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Country	HTN prevalence[1] (%)	Diagnosed[2] (%)	Treated[2] (%)	Controlled[2] (%)
WHO global reference	34	—	—	~23[3]

Notes: [1]Adults aged 30–79 years; denominator is the full population in that age range. [2]Percent among people with hypertension aged 30–79 years. [3]The 23% global controlled proportion is cited from the WHO global hypertension report; the country-profile graphs use a separate illustrative 50% control benchmark, not a reported global control rate. All figures are rounded; profiles represent 2024 model-based estimates [2–4].

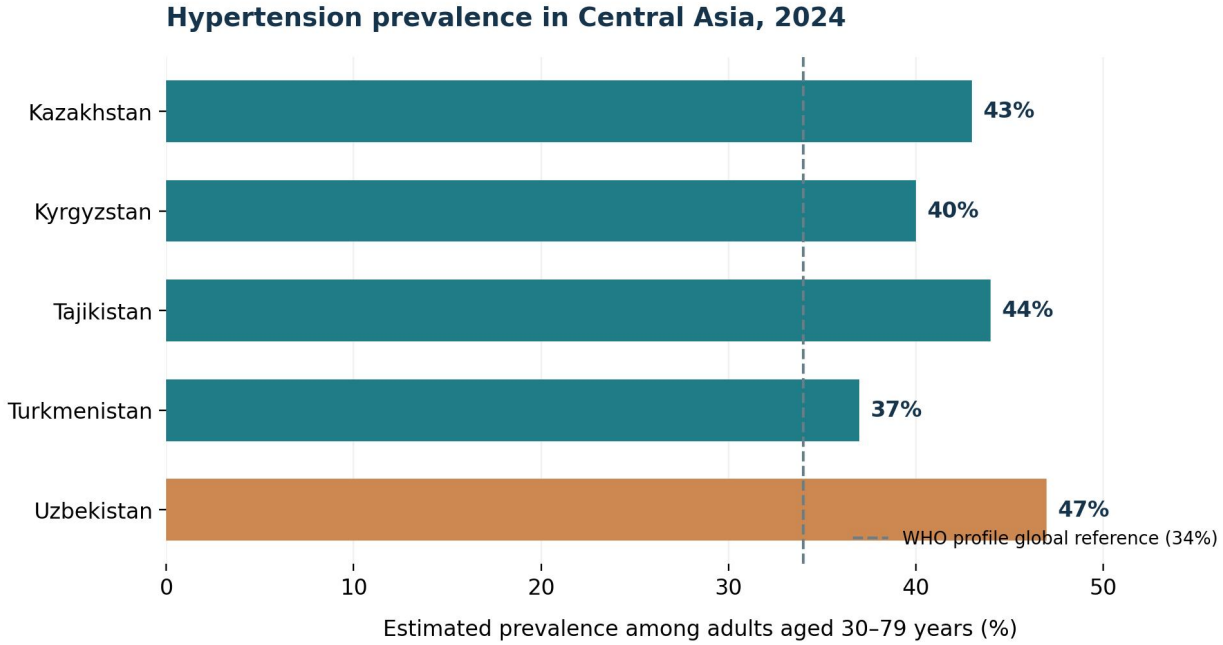


Figure 1. Estimated hypertension prevalence among adults aged 30–79 years in 2024, from WHO country profiles [4]; the global line is the 34% comparator displayed in the same profiles. The bars are not measured prevalence from a new 2024 field survey.

The care-cascade indicators reveal variation that is not explained by estimated prevalence alone. Kazakhstan's reported control proportion was 34%, substantially higher than the corresponding values for Uzbekistan (18%), Kyrgyzstan (12%), Turkmenistan (12%) and Tajikistan (8%). Treatment coverage also differed: 74% of affected adults in Kazakhstan were treated compared with 32% in Tajikistan. The 16-percentage-point gap in control between Kazakhstan and Uzbekistan represents a descriptive difference in WHO modeled proportions, not a statistically tested effect of a particular policy or treatment strategy [4].

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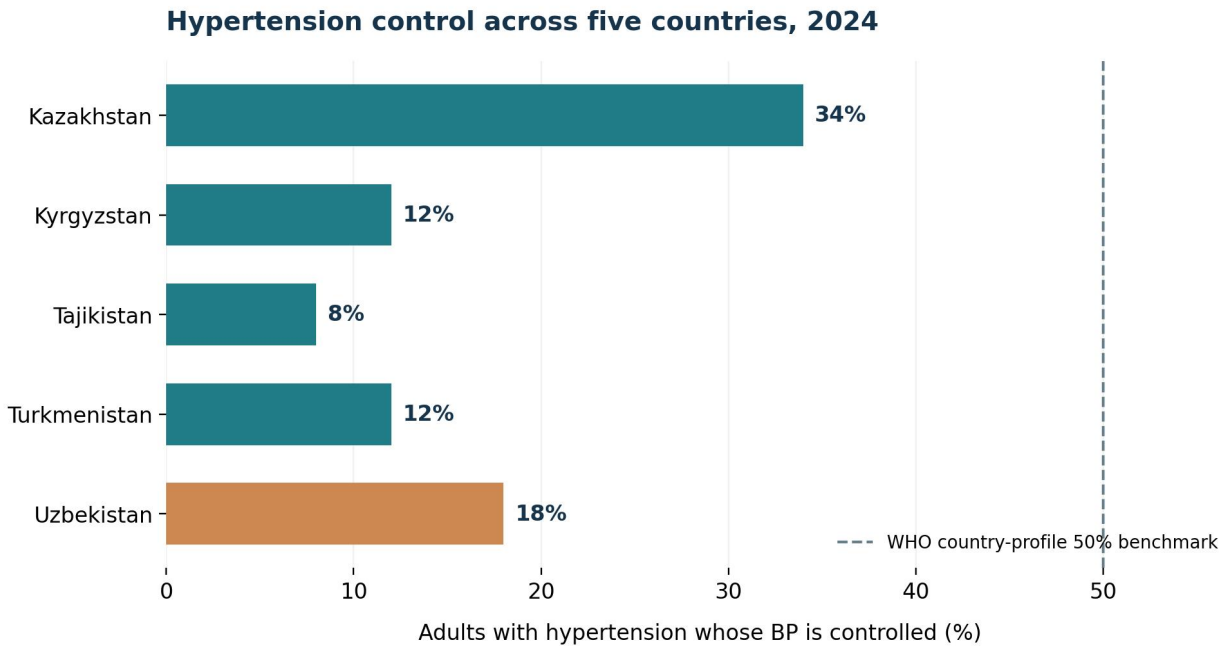


Figure 2. Controlled hypertension among adults aged 30–79 years already living with hypertension, 2024 WHO profiles [4]. The dashed 50% line is the aspirational country-profile comparator used by WHO; it is not the estimated global control proportion (approximately 23% [2]).

The Uzbekistan profile estimates approximately 8.0 million adults aged 30–79 years with hypertension in 2024, of whom about 4.2 million were diagnosed, 3.4 million treated and 1.4 million controlled. Approximately 6.6 million were therefore not controlled. The reported percentages of 53% diagnosed, 43% treated and 18% controlled illustrate attrition at successive stages of care. On reconstructing the four-status distribution from rounded percentages, 47% of adults with hypertension would be classified as undiagnosed, 10% diagnosed but untreated, 25% treated but not controlled and 18% controlled. These estimates should not be interpreted as patient-level transitions or exact independent survey counts [4].

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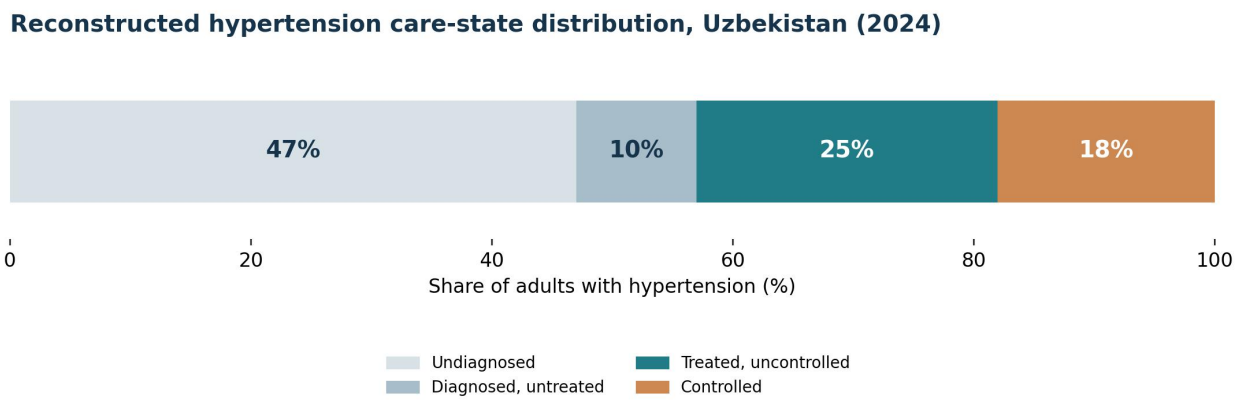


Figure 3. Algebraic partition of Uzbekistan's 2024 modeled hypertension care cascade using the rounded diagnosed (53%), treated (43%) and controlled (18%) proportions in the WHO profile [4]. Category percentages are derived by subtraction for descriptive visualization; no individual patient data were analyzed.

The accompanying risk profile for Uzbekistan suggests several complementary prevention priorities. WHO's 2025 country profile lists mean salt consumption of 9 g per day among adults aged 25 years and older in 2021, current tobacco use in 17% of people aged 15 years and older in 2022, obesity in 29% of adults aged 18 years and older in 2022, and physical inactivity in 32% of adults aged 18 years and older in 2022. The tobacco estimate was considerably higher among men (32%) than among women (1%), whereas modeled obesity and inactivity were higher among women. These indicators must not be summed to produce a prevalence of combined risk, because their denominators, time points and overlap differ [4].

Table 3. Uzbekistan: selected cardiometabolic risk factors and NCD-related indicators from the WHO 2025 profile.

Indicator	Both sexes	Men	Women	Reference year
Mean salt intake, g/day (25+ years)	9	10	7	2021
Current tobacco use, % (15+ years)	17	32	1	2022
Obesity, % (18+ years)	29	25	32	2022
Physical inactivity, % (18+ years)	32	26	37	2022
CVD deaths attributable to high SBP, %	54	53	55	2021

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Indicator	Both sexes	Men	Women	Reference year
Risk of premature death from 4 NCDs, %	25	28	21	2021

Note: Country-profile modeled estimates, not one uniform cross-sectional survey. The premature NCD risk is SDG 3.4.1 (death between ages 30 and 70 years), whereas "CVD deaths attributable to high SBP" is a population-attributable metric, not prevalence. Age-specific denominators differ, as specified in the indicator labels [3,4].

The regional GBD literature further situates the care gap in a high-burden environment. In a 2026 publication using GBD 2021 estimates, Central Asia had the highest age-standardized cardiovascular DALY rate among the six Asian regions examined (8,630.7 per 100,000). This rate measures healthy life years lost and should not be confused with the percentage of residents who currently have hypertension [15]. An important additional finding from the 2026 policy review is that prevention-policy implementation across Eastern Europe and Central Asia remains uneven; documented policy adoption cannot be assumed to imply uniform enforcement, access or downstream health impact [16].

DISCUSSION

The analysis illustrates why an epidemiological account of NCDs in Central Asia must extend beyond case occurrence to the effectiveness of health-system responses. Uzbekistan's modeled hypertension prevalence exceeded that of the other four countries in the 2024 WHO profiles, yet the more actionable observation may be the proportion of affected people who remained outside controlled treatment. A wide gap between diagnosis, treatment and control may arise from multiple interacting processes: limited or opportunistic detection, continuity-of-care problems, medication access, adherence challenges, therapeutic inertia, quality of measurement and socio-economic factors. The present aggregate data cannot distinguish which mechanisms account for the observed differences, and attributing the country gap to any one policy would require stronger causal evidence [2–5,12].

Interpreting regional variation also requires attention to epidemiological measurement. The WHO 2024 hypertension prevalence and control indicators come from a standardized projection model using historical survey inputs and population estimates, whereas the Uzbekistan STEPS 2019 survey provides directly collected measurements for a different age interval. A difference between these two statistics does not by itself demonstrate a temporal rise or fall. Model uncertainty, health-system data quality, changing age composition and possible variation in treatment access all deserve attention when communicating country estimates. The country-profile reference of 34% for global hypertension is a profile-level comparator, while the WHO global summary refers to approximately 33% of adults aged 30–79 years; minor rounding and reporting differences should not be construed as epidemiological disagreement [2–4,6,11].

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The combination of salt intake, tobacco use, adiposity, inactivity and environmental exposure creates a rationale for layered prevention rather than isolated awareness campaigns. Population-level salt reformulation, tobacco taxation and smoke-free environments act on exposure distributions, while primary-care blood-pressure assessment, standardized drug protocols and follow-up can address established risk and detect otherwise asymptomatic hypertension. WHO HEARTS and the 2024 Best Buys document provide practical starting points, but the effectiveness of any national deployment depends on implementation fidelity, sustainable medicine procurement and a transparent monitoring framework [8,9]. The WHO 2025 NCD Progress Monitor and a recent regional policy comparison underscore that policy adoption is an intermediate indicator, not a substitute for observed risk-factor reduction or clinical outcomes [7,16].

Sex differences in the Uzbekistan profile suggest that intervention design should account for who is exposed to which risks and how care is accessed. Much higher recorded tobacco use among men suggests a need for targeted tobacco control; higher modeled inactivity and obesity among women argue for accessible, culturally appropriate opportunities for physical activity and cardiometabolic screening. Nevertheless, aggregate sex-specific percentages do not establish causal mechanisms or reveal local barriers. Qualitative studies, regional STEPS survey updates and routine service analyses could help identify barriers without assuming uniform behavior within either sex [4–6,17,18].

The proposed surveillance-to-action matrix (Table 4) translates the descriptive findings into questions that can be monitored, rather than presenting a validated intervention program. The core recommendation is to specify the denominator, ascertainment method, year and level of inference for every indicator; to combine repeated representative risk surveys with routine primary-care process measures; and to evaluate whether changes in diagnoses translate into sustained treatment and control. For external validation, future work should examine subnational differences within Uzbekistan, including age-specific rates, sex-disaggregated follow-up, rural–urban access, medication availability and outcome trajectories. Data quality indicators should be reported alongside clinical targets.

Table 4. Proposed epidemiology-to-action framework for Uzbekistan (author synthesis, not a validated program).

Priority area	Proposed measurable indicator	Potential implementation response	Key limitation
Population risk surveillance	Age-/sex-specific BP, BMI, smoking and activity prevalence; survey year	Repeat representative STEPS; standardize definitions and publish uncertainty	Survey and modeled values cannot be equated
Early detection	Diagnosed share of adults with hypertension	Validated BP measurement, opportunistic screening and	More diagnoses do not automatically imply control

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Priority area	Proposed measurable indicator	Potential implementation response	Key limitation
		documented referral	
Treatment continuity	Treated share, refill availability and 6–12-month follow-up	HEARTS-aligned protocols, medicine access, team-based monitoring	Routine-record completeness may vary
Effective control	Controlled proportion among those with hypertension	Audit BP control and intensification pathways; assess adherence barriers	Avoid cross-country causal claims
Exposure reduction	Salt intake, tobacco use, inactivity, obesity by sex and age	WHO Best Buys on sodium, tobacco, activity and nutrition	Population-level impact requires prospective monitoring
Equity and outcomes	Rural–urban coverage, sex gaps, premature NCD mortality	Subnational registries and linkage to health outcomes	Confounding and administrative coding remain concerns

Important limitations should constrain interpretation. This is not a systematic review; source selection was targeted and no formal meta-analysis, effect estimate or inferential cross-country test was undertaken. The five-country comparison is based largely on a single harmonized WHO modeling exercise and therefore cannot independently validate its source assumptions. Differences in the timing and denominators of salt, smoking, obesity, inactivity and mortality statistics preclude construction of a single composite cardiometabolic risk index. Rounding affects the reconstructed care cascade. Data were not available for detailed district-level comparisons or mechanistic analyses of policy impact. In addition, none of the proposed actions was implemented or evaluated within this paper, so statements about improved future outcomes remain hypotheses to be tested.

6. CONCLUSION

The most recent harmonized WHO country profiles identify a substantial cardiometabolic prevention and management challenge across Central Asia. In 2024, estimated hypertension prevalence ranged from 37% to 47% among adults aged 30–79 years in the five countries examined, while control among affected individuals ranged from 8% to 34%. Uzbekistan had the highest modeled prevalence (47%) and controlled hypertension in an estimated 18% of affected adults. The combination of a substantial undiagnosed fraction, incomplete treatment coverage and persistent uncontrolled blood pressure among treated patients indicates that increasing screening alone is unlikely to be sufficient. A stronger epidemiological response will link renewed representative surveillance with measurable improvements in diagnosis, treatment continuity, BP control, and prevention of behavioral

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and metabolic risks. These conclusions concern a descriptive secondary analysis, and the effectiveness of the suggested framework requires prospective evaluation.

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