Research Square

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Diabetes Treatment Coverage, Sex Disparities, and Geographic Inequalities in South Asia and MENA, 2000–2022: A Longitudinal Ecological Study from a Healthcare Management Perspective

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Research Article

Keywords: diabetes mellitus, medication treatment coverage, South Asia, Middle East and North Africa, health inequality, ecological analysis, government effectiveness

Posted Date: November 19th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11578837/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

Medication treatment coverage among adults with diabetes captures a clinically consequential dimension of access to care. We characterized 2000–2022 inequalities in modeled treatment coverage across 28 South Asian and Middle East/North African countries and examined exploratory associations with changes in government effectiveness.

Results

The study included 1,288 country–sex–year estimates (eight South Asian and 20 Middle East/North African countries). Between-country 90th–10th percentile coverage gaps increased from 14.7 to 25.3 percentage points for South Asian men and from 22.2 to 31.4 for South Asian women; corresponding changes in the Middle East and North Africa were 20.1 to 28.8 and 26.1 to 32.1. Pakistan's treatment coverage changed from 25.4% to 25.9% for men and 24.0% to 27.5% for women. A fixed-effects regression of 140 country-period observations found a government-effectiveness coefficient of 0.0005 percentage points/year per one-score-point/year change (95% confidence interval, conditional on modeled outcomes: -0.026 to 0.027; wild cluster bootstrap p = 0.968). Source-estimate uncertainty was not propagated to regression intervals.

Conclusions

Country-level treatment-coverage point estimates suggest increasing geographic dispersion in both regions alongside heterogeneous sex gaps. The governance association was not distinguishable from zero in this ecological analysis; the evidence does not support a causal interpretation. Clinical-service monitoring should include treatment access, continuity and glycaemic outcomes, supported by primary data.

Background

Diabetes has an expanding global health burden: the International Diabetes Federation estimates that 589 million adults aged 20–79 years had diabetes in 2024, while cross-national clinical care remains highly uneven [1]. Although the prevalence rate of diabetes and glycaemic control are different indicators from diabetes-related medication, diabetes medication can help prevent symptomatic hyperglycaemic states and reduce disease-related complications [2]. Treatment coverage is also only a single step in a treatment journey and doesn't capture the quality of treatment nor the quality of ongoing clinical care.

Global analyses have already reported significant variations in treatment and diagnostics by settings [3]. Even seemingly similar treatment estimates can change significantly due to care-cascade denominators and diabetes definitions [4]. Individual-level research in 55 low-income and middle-income countries found important unmet need for both glucose-lowering and cardiovascular risk reduction therapy [5]. Those results encourage comparisons in an open manner, with a focus on outcomes, as opposed to conflation of medication use, clinical control and health-system performance.

At a national level in India, an uptake of anti-diabetic medications and glycaemic control has been documented, which has seen significant variation across sub-national and socioeconomic levels in India [6]. Further gaps along the treatment continuum have been identified through surveys in Bangladesh, Bhutan and Nepal [7]. In the Middle East, there is related evidence that comes from a survey of the Iranian population that has been conducted [8]. Data on the national burden of metabolic diseases in India [9] and the second National Diabetes Survey in Pakistan [10] highlight the need to consider population burden of disease metrics somewhat different from treatment coverage.

Other regional policy analyses also cover challenges in service delivery in vulnerable regions of the Eastern Mediterranean [11] and strategies for continuous diabetes management in South and Southeast Asia [12]. But treatment-coverage percentage is not a measure of the pharmacological practice recommendations, which require individualized treatment choices and ongoing reassessment.

The present analysis focused on between-country distributional changes and sex gaps within a defined panel of eight South Asian and 20 Middle East/North African settings from 2000 to 2022. The descriptive estimands differed from the other global prevalence calculation and were changes in the distribution of country-specific coverage estimates. An exploratory ecological model was used to see if there were tracking relationships between changes in a broad measure of government effectiveness and changes in coverage after country and interval adjustment. We expected any such association to be difficult to interpret clinically because government effectiveness does not directly measure drug procurement, clinic performance, or treatment continuity.

Methods

Study design, setting and study population

This was an ecological, longitudinal analysis based on the publicly available country-level modeled data for 2000–2022. We included eight South Asian countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka) and 20 countries in an operational Middle East and North Africa (MENA) grouping (Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates and Yemen). Notably, the country panel and regional groupings did not change at all. Estimates for the descriptive unit were made on a country–sex–year basis, not for a single participant. Observations of both sexes were available for all 28 countries in all 23 years, providing 1,288 observations.

Data sources and variables

The outcome was the age-standardized "Proportion of people with diabetes who were treated (30 + years)" for men and women, obtained from the 2024 NCD Risk Factor Collaboration (NCD-RisC) country archive [14]. This is not an indicator of prevalence of diabetes, or glycemic control or treatment adequacy among adults with diabetes age 30+, but of the estimated proportion of adults with diabetes who are taking diabetes medication. Fractions have been converted to percentages for point estimates and 95% marginal uncertainty limits. Only the following columns were extracted: age-standardized rows, country codes, years, unique keys, and an expected number of records were checked.

The explanatory indicator is the World Bank Worldwide Governance Indicators (WGI) government-effectiveness score (0–100) [15]. Historical series data for it are available for the period 2026. The associated marginal 90% WGI bounds were kept for measurement-uncertainty diagnosis purposes. It is a wide-ranging governance indicator, which relies on perception, rather than being a direct measure of medicine availability; and the method used to construct it was subject to methodological limitations when it was last updated [16] [17]. Adjusted models included World Development Indicators for real GDP per capita, constant 2015 US dollars, as well as urban population share [18]. Both were analyzed as time-varying national contextual indicators.

Hard-coding, Descriptive analysis, and uncertainty.Hard-coding, Descriptive analysis, and uncertainty.

The unweighted country mean, median, interquartile range, and between-country P90–P10 gap (90th to the 10th percentile) for each year and region-sex were calculated. We evaluated the direct differences of percentage points between 2000 and 2022. In the following, the sex gap was the treatment coverage of women minus the treatment coverage of men, and the regional gap was the country-unweighted average. The changes to the endpoints in Pakistan were described separately. Since the NCD-RisC estimates are model estimates, they are correlated by region and by year. The summaries were provided as descriptive and significance testing of regional trends, and inequality was not performed. Limited diagnostic endpoint change envelopes were deduced by arithmetic subtraction of opposite marginal 95% uncertainty limits of envelopes and are not joint 95% intervals or tests of change. The nonoverlapping WGI marginal 90% bounds were also interpreted only as indicators with the resolution of measurements.

Country-period models and statistical inference

For regression, we constructed five nonoverlapping periods (2000–2005, 2005–2010, 2010–2015, 2015–2019 and 2019–2022), producing 140 country–period records. The outcome was the mean change in treatment coverage (endpoints between men and women) over elapsed years (percentage points/year); the exposure was the corresponding annualized WGI-score change. We fitted unweighted ordinary least-squares models with country and period fixed effects: annualized treatment change = country effect + period effect + β × annualized WGI change + error. Additional measures were added in the adjusted specification: annualized change in log real GDP per capita and annualized change in urban population percentage. One governance exposure and 1 equal-sex outcome were provided from each country–period.

Standard errors were clustered by country, using a small-sample correction. 95% confidence intervals and Wald-type p-values were two-sided and had 27 degrees of freedom in 28-country models. For the primary and adjusted models, null-imposed, Rademacher wild cluster bootstrap-t tests with 1,999 replications and seed 20261031 were also carried out [19] [20]. Since joint uncertainty of the source estimates was not provided and could not be propagated to the inference, this uncertainty was not considered. Association was not causal and was exploratory.

Missing data, sensitivity analysis and reproducibility

All 140 country–period data were added to the main model. For the periods 2015–2022, the GDP results for three of the Djibouti periods and two of the Yemen periods were missing, resulting in 135 periods with GDP results for adjustment. There was no imputation of data, and no common-sample model was used, which meant that there was no difference between selection and adjustment. The sensitivity analyses excluded six Gulf economies, performed separate regional models, repeated the adjusted model without 2019–2022 data, and omitted one country at a time. Programming languages that were used for analysis comprised Python (pandas, NumPy, SciPy, and statsmodels), while graphs were created in matplotlib. This package contains an archived set of source extracts, checksums, executable scripts, derived panels, uncertainty diagnostics, and four supplementary datasets. Reporting was guided by STROBE [21], and findings are based on modeled estimates and are aggregate; therefore, individual treatment effects cannot be established.

Computational assistance and research accountability

They used an OpenAI large language model to help them construct code, execute statistics, identify literature, and write manuscripts. Preserved original source files are used to generate the outputs used in the analysis using provided reproducible Python scripts. The named authors are responsible for interpretation, verification, and acceptance for publication of text.

Results

Analytic population and data completeness

A total of 1,288 age-standardized point estimates of treatment coverage were analyzed across 28 countries, 2 sexes and 23 calendar years (between 2000 and 2022). 20 countries were grouped into an operational Middle East and North Africa (MENA) category, and eight into South Asia. All country–sex–year outcomes and their published marginal uncertainty intervals were available. Thus, the descriptive panel consisted of a balanced mix of 56 such combinations (country-sex dimensions). The 2000, 2005, 2010, 2015, 2019 and 2022 endpoints produced 140 unique country-period observations. A total of 135 data

records were available for the adjusted analyses-five country-period records were missing complete data on GDP per capita change, three involving Djibouti and two involving Yemen.

Treatment coverage and geographic dispersion

Equal-country mean coverage among South Asian men was 25.2% in 2000 and 26.3% in 2022, an increase of 1.1 percentage points. The corresponding values for South Asian women were 25.1% and 30.0% (change 4.8 points). In MENA, the respective changes were 9.6 percentage points for men (38.5% to 48.2%) and 8.6 points for women (40.9% to 49.5%). Table 1 presents regional means and dispersion estimates; Fig. 1 shows annual trajectories together with descriptive interquartile ranges across countries.

Table 1
Regional treatment coverage and between-country dispersion, 2000 and 2022

Region	Sex	Mean 2000 (%)	Mean 2022 (%)	Change (pp)	P90–P10 2000 (pp)	P90–P10 2022 (pp)
South Asia	Men	25.2	26.3	+ 1.1	14.7	25.3
South Asia	Women	25.1	30.0	+ 4.8	22.2	31.4
MENA	Men	38.5	48.2	+ 9.6	20.1	28.8
MENA	Women	40.9	49.5	+ 8.6	26.1	32.1

Values are equal-country summaries of NCD-RisC model point estimates, not population-weighted regional estimates or confidence intervals. MENA, Middle East and North Africa; pp, percentage points; P90–P10, 90th minus 10th country percentile.

Lines are regional means of country point estimates; shaded bands denote the between-country interquartile range and not model-based uncertainty intervals.

Between-country dispersion increased on the point-estimate scale. For South Asian men, the P90–P10 gap widened from 14.7 to 25.3 percentage points; for women it widened from 22.2 to 31.4 points. The corresponding gaps in MENA increased from 20.1 to 28.8 points for men and from 26.1 to 32.1 points for women (Fig. 2 shows country-level changes and Fig. 3 shows annual dispersion). Because these are summaries of modeled estimates, no posterior probability of widening was calculated.

Sex differences and Pakistan-specific estimates

The mean country-level women-minus-men gap was − 0.1 percentage points in South Asia in 2000 and 3.7 in 2022; women had higher modeled coverage in 1 of eight countries in 2000 and 6 in 2022. In MENA, mean gaps were 2.4 and 1.4 percentage points, with female coverage higher in 17 of 20 countries at baseline and 14 at the endpoint (Table 2). These descriptive comparisons do not establish statistically supported sex inequities within individual countries.

Table 2
Country-level women-minus-men treatment-coverage gaps at study endpoints

Region	Year	Mean gap (pp)	Median gap (pp)	Countries: women higher
South Asia	2000	-0.1	-0.9	1/8
South Asia	2022	3.7	2.1	6/8
MENA	2000	2.4	2.6	17/20
MENA	2022	1.4	1.5	14/20

Gap = women's coverage minus men's coverage, expressed in percentage points; positive values indicate higher modeled coverage among women. Country contributions have equal weight.

For Pakistan, men's modeled coverage was 25.4% in 2000 and 25.9% in 2022 (difference 0.5 points). The corresponding women's estimates were 24.0% and 27.5% (difference 3.6 points). Pakistan's women-minus-men coverage gap changed from − 1.5 to 1.6 points. The original marginal uncertainty bounds are broad: in 2022, 7.1–52.4% for men and 8.2–54.8% for women (Additional file 2). Neither Pakistan endpoint-change arithmetic envelope excludes zero; these are not posterior credible intervals for change.

Country-level heterogeneity

The equal-sex mean of country endpoint changes ranged from a decline of 4.8 percentage points in Nepal to an increase of 25.5 points in Jordan (Fig. 2). Three countries had negative point-estimate changes in equal-sex mean coverage: Nepal, Bangladesh, and Iran. The ranks shown are descriptive in nature and can be unstable, as there are significant amounts of marginal uncertainty intervals that overlap in many countries. Additional file 2 presents the country-specific changes and simple endpoint uncertainty envelopes.

Bars reflect the arithmetic mean of men's and women's point-estimate changes within each country, not patient-level trends, posterior probabilities, or population-weighted regional estimates.

Lines track the difference between the 90th and 10th country percentiles of modeled point estimates. They are not inferential trends or uncertainty intervals.

Ecological associations and uncertainty checks

In the primary 140-observation country-period fixed-effects model, a one-point/year greater change in the WGI government-effectiveness score was associated with 0.0005 percentage points/year greater treatment-coverage change (country-clustered 95% confidence interval, conditional on source point estimates: -0.026 to 0.027; cluster-t p = 0.968). A null-imposed wild cluster bootstrap-t test using 1,999 Rademacher replications gave p = 0.968. In the 135-observation GDP-and-urbanization-adjusted model, the coefficient was 0.0095 (95% conditional confidence interval − 0.020 to 0.039; cluster-t p = 0.509; bootstrap p = 0.464; Table 3). Estimates are ecological and cannot be interpreted as individual patient effects.

Table 3
Fixed-effects associations and prespecified sensitivity analyses

Model	Obs.	Countries	Coefficient	95% CI*	p*
Primary unadjusted: all available	140	28	+ 0.0005	-0.026 to + 0.027	0.968
Unadjusted: adjusted-model common sample	135	28	-0.0002	-0.028 to + 0.028	0.988
Adjusted: GDP and urbanization	135	28	+ 0.0095	-0.020 to + 0.039	0.509
Excluding 2019–2022	112	28	+ 0.0074	-0.029 to + 0.044	0.680
Excluding six Gulf economies	110	22	+ 0.0049	-0.031 to + 0.041	0.778
South Asia exploratory	40	8	+ 0.0128	-0.024 to + 0.050	0.438
MENA exploratory	100	20	+ 0.0003	-0.029 to + 0.030	0.982

*Confidence intervals and t-reference p-values use country-clustered standard errors with degrees of freedom equal to the number of countries minus one; they condition on NCD-RisC point estimates. Outcome and exposure both represent annualized change; coefficient units are treatment-coverage percentage points per year per one WGI-score point per year. Country and period fixed effects are included; the adjusted model adds log GDP-per-capita and urban-share changes. Regional analyses are exploratory and underpowered.

Excluding the pandemic-era 2019–2022 interval produced a primary coefficient of + 0.0074; excluding six Gulf economies produced + 0.0049. Leave-one-country-out coefficients ranged from − 0.0031 to + 0.0081 (Fig. 4; Additional file 3). The WGI marginal 90% score intervals at the endpoints of all 140 country-period comparisons overlapped, which illustrates the limited resolution of within-country governance changes; interval overlap is a descriptive diagnostic rather than a formal test of zero change. None of the regression uncertainty results incorporate the covariance or posterior uncertainty of the NCD-RisC outcome estimates.

Points and whiskers show country-clustered coefficients and conditional 95% confidence intervals. The dashed vertical line is zero; the dotted line is the full-sample coefficient. Neither source uncertainty nor governance measurement error is propagated.

Discussion

Principal findings and clinical interpretation

Across a 28-country panel, mean estimated medication treatment coverage increased more in MENA than in South Asia from 2000 to 2022. However, the distribution of the modeled coverage point estimates increased in both analytical areas. The finding is clinically salient as cumulative increases in treatment utilization may exist within a context in which adults with diabetes continue to be significantly less likely to receive glucose-lowering treatment. These estimates, however, are not evaluations of the quality of clinical prescribing, optimization of dosage, or level of glycemic control.

Pakistan illustrates the need for careful interpretation of apparently modest changes. The modeled male coverage proportion was nearly unchanged, whereas the female point estimate increased by several percentage points. However, the uncertainty intervals for the sources are sufficiently broad that these changes in the endpoints should not be interpreted as proven changes in access or proven divergence by sex. A more detailed clinical response involves more detailed surveillance with a representative survey, prescriptions register, and health-facility supply measurement; it has a clearly defined denominator and measures glycemic outcomes.

Relation to existing evidence

The 2024 global NCD-RisC analysis documented international differences and temporal trends in medication treatment coverage [2], while the global care-cascade study extended comparisons to diagnosis and glycemic control [3]. Next, using data from NCD-RisC, Liu et al. quantified global diabetes prevalence inequalities and their treatment coverage and projected these trends up to 2040 using slope and relative concentration indexes of inequality (RCIs) [22]. The present study therefore does not purport any originality in either revealing treatment disparities across international boundaries or the growing inequalities in the world. Its smaller impact is to measure the rise or fall in the P90–P10 geographic dispersion and the male/female sex gaps within each panel for individual South Asian and Middle East/North African countries over the period 2000–2022 and to additionally conduct an exploratory fixed-effects analysis on changes in government effectiveness. It does not estimate the global socioeconomic concentration indices nor predict treatment coverage beyond year 2022 as done in Liu et al. Differences in target age groups and inequality measures limit direct comparison of effect sizes; the regional dispersion findings here remain descriptive summaries of modeled point estimates, without joint posterior evidence for statistically confirmed widening.

A medication-use percentage is just one metric of health-system performance, as revealed by regional survey research. India has continuum research that shows a difference across districts and demographic groups [6]; the analyses carried out in Bangladesh, Bhutan and Nepal document screening, diagnosis, treatment and control gaps; and the Iranian STEPS study examines gaps along the continuum. The absolute percentages of these studies should not be necessarily compared or used interchangeably with the NCD-RisC age-standardized treatment series, and these studies have different underlying populations and definitions. The issue of such definitional discrepancies is highlighted by the design of the 2026 comparative cadre of cascade methods study [4].

Governance and system-level context

In the main model, the ecological association with government effectiveness was near zero and was unclear after socioeconomic confounds. The null regression coefficient does not mean that health governance does not matter for the care of diabetes, nor could it be interpreted as indicating a policy choice to down-prioritize health governance. The government-effectiveness index is an index used by the World Bank to reflect the overlapping broad perceptions regarding public-service quality and policy implementation, which has large measurement error. Drug stock availability, clinician staffing, insurance coverage, referral systems, and medication continuity are more proximal determinants of clinical treatment access but were not observed consistently over this panel.

Some recent data from fragile Eastern Mediterranean settings highlight implementation gaps in terms of diabetes policies, availability of insulin in primary care, and surveillance infrastructure [11]. Southeast Asia experience with WHO service delivery also underscores the need for integrated care, diagnostics and essential medicines [12]. These mechanisms are a way of thinking about the reason that more generically applicable governance measures might be too indirect or too slowly moving to capture shorter-term shifts in diabetes medication use. They are not ecological regressions, but rather hypotheses that need facility- and patient-level data.

Strengths, limitations and interpretation of uncertainty

It included a common multi-country outcome definition, 23 annual estimates for each country-sex pair, a clear country–period design, where there were no country-exposure overlaps, cross-country dispersion and sex gaps were quantified directly, and regression sensitivity analyses were implemented with cluster correction. The source files, executable scripts, tabular output and documentation are provided for repeatability. Common period shocks (but not necessarily all time-varying confounders) are addressed by use of period fixed effects; and the use of country fixed effects is designed to reduce the confounding for time-invariant country attributes.

Several limitations materially constrain the strength of inference. First, the outcome is a Bayesian model-based estimate rather than individual-level observations. The published marginal 95% uncertainty intervals were available, but joint draws and cross-year posterior covariance were not; neither country endpoint changes nor cross-country dispersion trends have calibrated joint posterior intervals. The endpoint arithmetic envelopes computed from the marginal bounds are sensitivity descriptors, not 95% credible intervals for change. Second, the measure used for governance is fairly broad, with 90% confidence margins and the possibility of changing perceptions of each source over time, precluding the possibility of classical regression corrections for its measurement error. Third, the annual outcome estimates inherit smoothing and shared-data dependence from NCD-RisC, so the modeled years should not be interpreted as independent samples or newly collected annual clinical records. Fourth, regression precision is restricted by the use of 28 country clusters, and few-country regional analyses are exploratory, although they make use of small-cluster methods. Fifth country: equal weighting regardless of the number of diabetes population in each country; not a population-weighted outcome for the equal-sex composite. Sixth, setting classifications are operational, not geographic or WHO-region based, and thus region summaries could be impacted by setting changes.

Analysis is ecological and observational - no patient-level confounders have been measured, and medication treatment in adults 30 years of age and older cannot be algebraically combined with diabetes prevalence in adults 18 years and older. The lack of GDP observations was largely in Djibouti and Yemen, possibly skewing the adjusted regression in comparison with the full panel. Receipt of treatment does not indicate adherence, right choice of drug, renal protection, cardiovascular protection, or outcomes of complications. Therefore, clinical recommendations should be made from the direct clinical evidence, and monitored quality metrics must be included and not rely on the regression value alone.

Implication for internal medicine

The findings are useful for clinicians and service planners to monitor with regard to access to and continuing use of medication, glycated hemoglobin control and cardio-renal risk management, in addition to diagnosis. Modern diabetes drug therapy is focused on personalizing drug selection, re-evaluating, and risk-based prescribing [13]. Representative longitudinal surveys in connection (where applicable) with surveys of facilities, dispensing of medicines and insurance coverage and clinical outcomes would be suitable for monitoring in Pakhtunkhwa and in other settings. These studies could provide a way of determining whether within-country variation is due to the availability, affordability, continuity or distribution of diabetes burden and not only to a general governance index.

Conclusions

This 28-country South Asia–MENA panel produced estimates of treatment coverage that indicate greater dispersion across countries over the period 2000–22, but sex-specific gaps were varied, and progress was limited in some countries, such as Pakistan. The association between change in the government effectiveness domain and change in the medication coverage domain was exploratory and almost null. Data suggest cautious scrutiny of these geographic inequities in diabetes treatments and access, but lack formal causal inference of health-system determinants. Good individual- and facility-level data are necessary to assess clinically actionable mechanisms.

Abbreviations

CI

confidence interval
GDP
gross domestic product
MENA
Middle East and North Africa
NCD-RisC
NCD Risk Factor Collaboration
pp
percentage points
P90–P10
90th minus 10th percentile
WDI
World Development Indicators
WGI
Worldwide Governance Indicators.

Declarations

Author Contribution

H.A. conceptualized and designed the study, developed the research framework, and drafted the manuscript. S.O. contributed to data acquisition, literature review, and data curation. K.M. contributed to methodology development, interpretation of findings, and critical manuscript revision. M.F.S. performed statistical analyses, validated the results, and prepared figures and tables. M.M. contributed to data interpretation, methodological review, and manuscript editing. All authors reviewed and approved the final manuscript and agreed to be accountable for the work.

Data Availability

Data AvailabilityThis study used publicly available secondary data from the NCD Risk Factor Collaboration (NCD-RisC), the World Bank Worldwide Governance Indicators (WGI), and World Development Indicators (WDI). The NCD-RisC dataset is available at https://doi.org/10.5281/zenodo.13987399, while governance and socioeconomic data are accessible through https://www.worldbank.org and https://data.worldbank.org. The processed datasets, statistical analysis code, and reproducibility materials are provided as supplementary files accompanying the manuscript.

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Figures

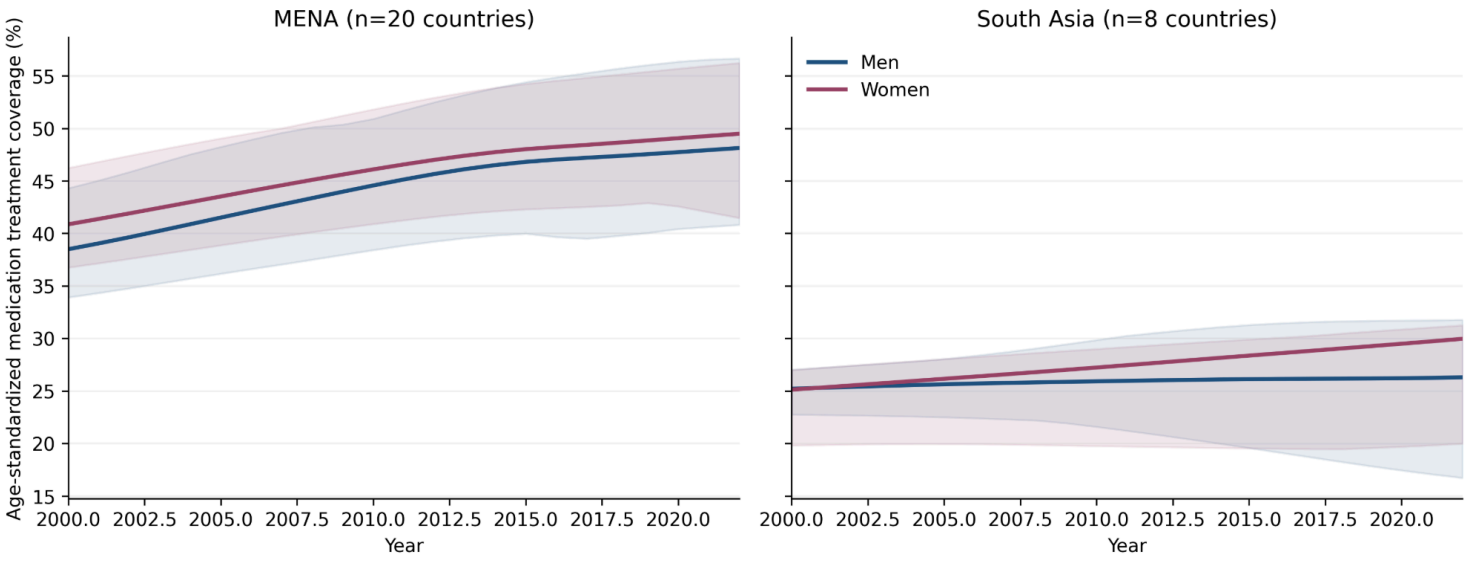


Figure 1

Country-unweighted medication treatment coverage trajectories by region and sex.

Lines are regional means of country point estimates; shaded bands denote the between-country interquartile range and not model-based uncertainty intervals.

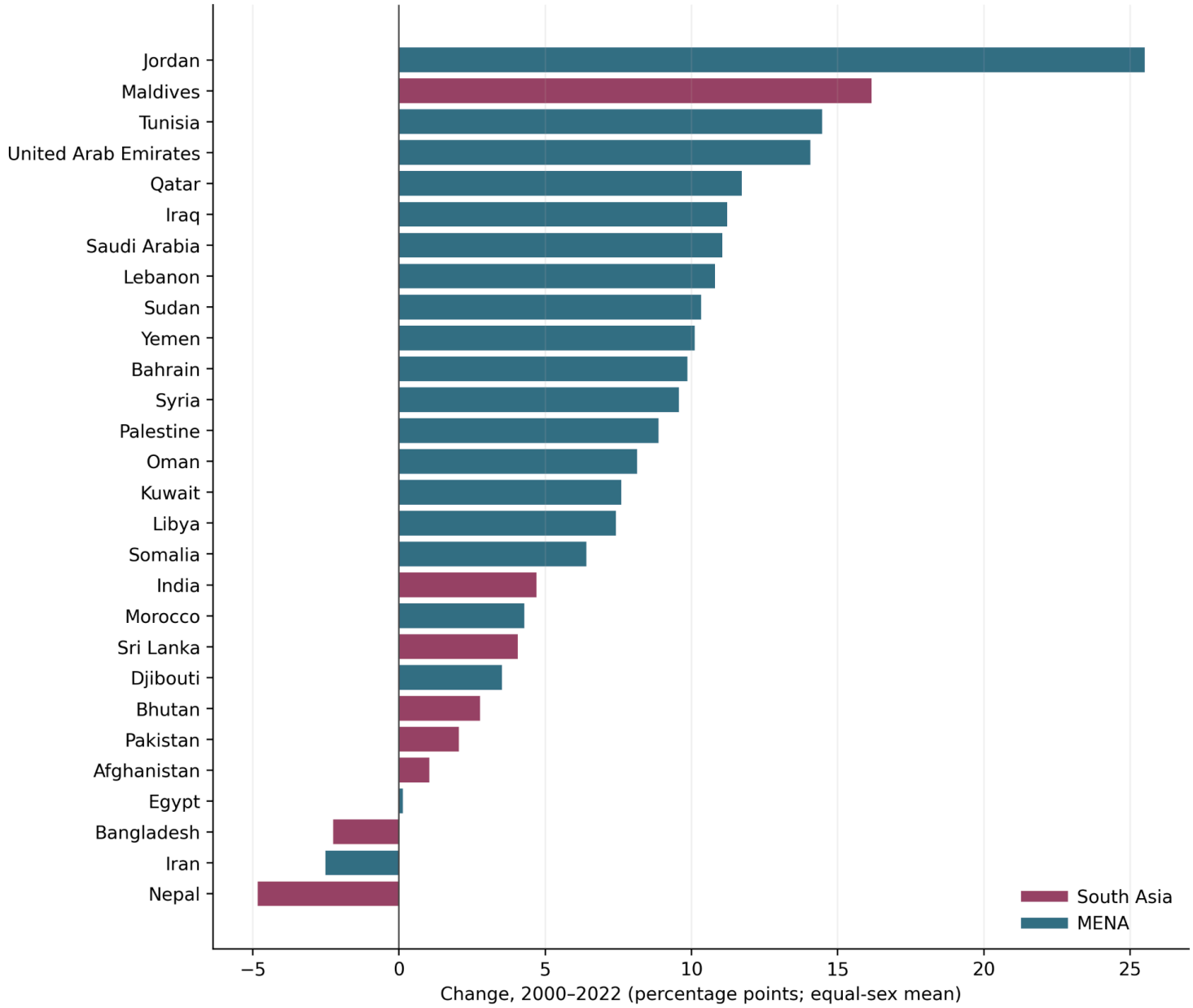


Figure 2

Country-specific changes in equal-sex medication coverage from 2000 to 2022.

Bars reflect the arithmetic mean of men's and women's point-estimate changes within each country, not patient-level trends, posterior probabilities, or population-weighted regional estimates.

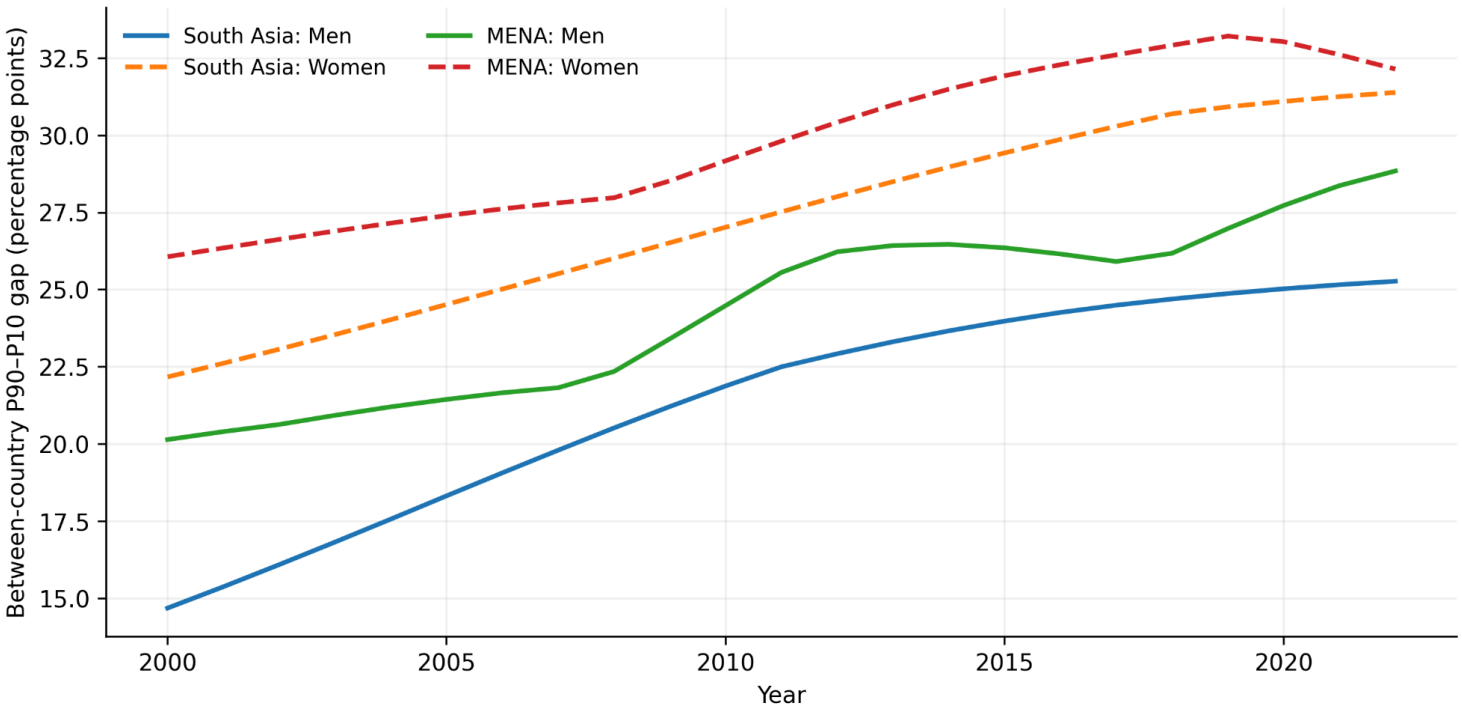


Figure 3

Descriptive between-country P90–P10 treatment-coverage differences, 2000–2022.

Lines track the difference between the 90th and 10th country percentiles of modeled point estimates. They are not inferential trends or uncertainty intervals.

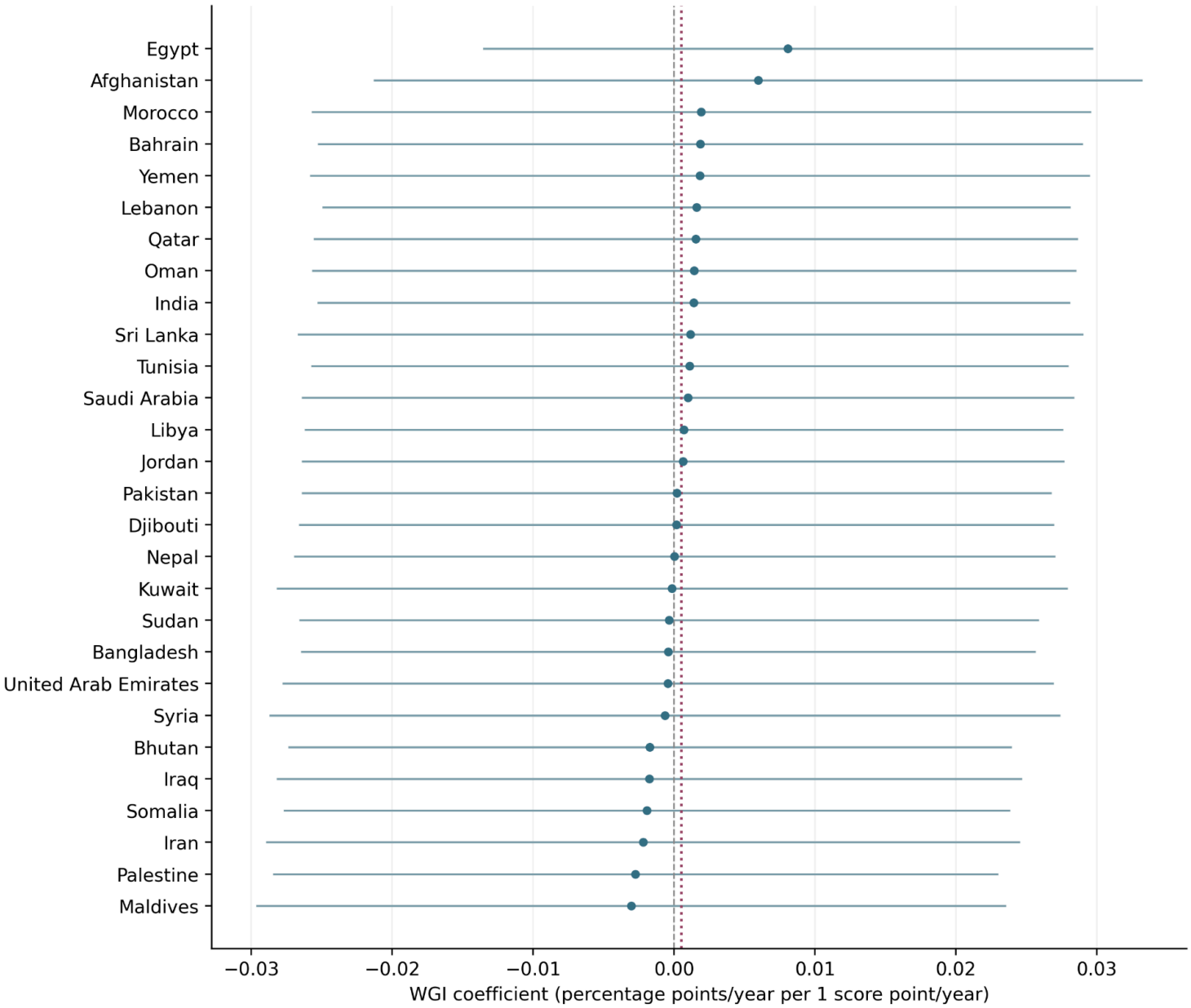


Figure 4

Leave-one-country-out government-effectiveness coefficients in the primary ecological model.

Points and whiskers show country-clustered coefficients and conditional 95% confidence intervals. The dashed vertical line is zero; the dotted line is the full-sample coefficient. Neither source uncertainty nor governance measurement error is propagated.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Additionalfile3leaveonecountryout.csv
- Additionalfile2countryendpointuncertaintyenvelopes.csv
- Additionalfile4countryperiodanalysispanel.csv
- Additionalfile1countrysexyear.csv
- runanalysis.py
- buildmanuscript.py
- countryperiodpanel.csv
- worldbankcontextcountryyear.csv

- ncdtreatmentcountrysexyear.csv