THE LANCET

Supplementary appendix

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Supplement to: Gregg EW, Buckley J, Ali MK, et al. Improving health outcomes of people with diabetes: target setting for the WHO Global Diabetes Compact. *Lancet* 2023; published online March 14. https://doi.org/10.1016/S0140-6736(23)00001-6.

SUPPLEMENTARY MATERIAL

Contents:

Summary of Methods and Steps to Recommend *Global Diabetes Compact* Metrics and Targets:

To prioritize metrics and target levels, we followed a systematic process (Figure S1). First, we organized potential metrics across 4 domains (policy and system-level factors, processes of care, biomarkers and behaviours, and health events and outcomes) and risk tiers (diagnosed diabetes, high risk for diabetes, whole population).[1] Second, the authors reviewed, scored, and filtered, and then prioritized metrics through a consensus-based process according to their health importance, modifiability, data availability, and the degree to which they represent areas of global inequality. This led to a set of "core" and "complementary" metrics. The core metrics are intended for priority implementation by UN member states and monitoring by the *Global Diabetes Compact*. The complementary metrics currently lack adequate global data availability or consensus-based definitions, and thus are currently unsuitable for recommendation as core *Compact* metrics but should be considered for scale-up in population health data and surveillance systems. Third, we reviewed published and unpublished data on the current levels of attainment of the chosen metrics, by global region and country and evidence from modelling-based studies to estimate the expected health impact of meeting different target levels. Fourth, we used the information and evidence from these steps to propose a set of *target levels* for core metrics. Finally, the proposed metrics and target levels were presented to a WHO-convened, international review panel and reviewed by member states' ministries of health and WHO regional offices. Our recommendations incorporate input from all steps in this process.

Figure 1. Methods and steps to recommend *Global Diabetes Compact* metrics and targets.

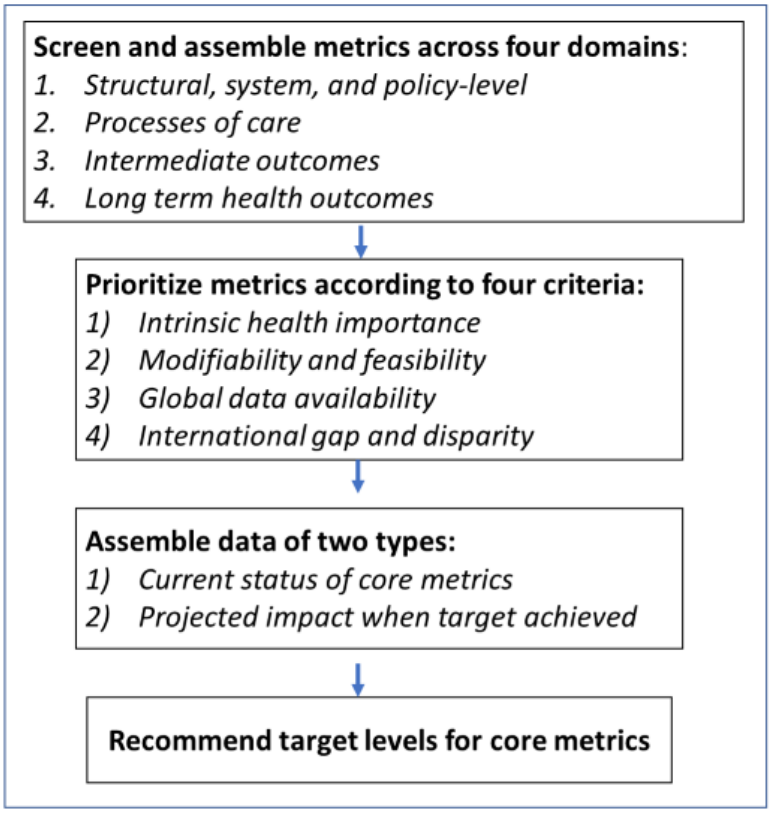


Table S1. Criterion and rating scale for potential metrics of the *Global Diabetes Compact*.

Criterion	Excellent	Good	Fair
Intrinsic **health importance** or strong evidence for prediction or benefit on major health outcomes.	Major health outcome affecting QOL (e.g., MI, LEA).	Biomarker or intervention with clear causal linkage to health outcome.	Process, intervention, or factor with potential linkage.
Modifiable with scalable interventions targeting the metric.	Clearly efficacious and scalable via evidence-based means.	Moderately efficacious and scalable.	Lacking clear scalability – or – clear health effect if scalable.
Strong global **data availability** with acceptable measurement properties.	Currently available for 75% of countries.	Currently available for 25 - 75% of countries.	Available for fewer than 25% of countries.
International gap and disparity	Large proportion of population affected and large international variation	Large proportion of population affected – OR - large international variation	Modest international gap or limited variation

LEA, lower-extremity amputation; MI, myocardial infarction; QOL, quality of life.

Methods of Data Assembly and Literature Review:

To inform the selection of target levels for core metrics, we assembled data from the Global Health and Population Project on Access to Care for Cardiometabolic diseases (HPACC), recent systematic reviews,[2,3] and additional literature searches. The data assembly and study inclusion methods of the HPACC have been described.[2,4,5] In brief, the HPAAC consists of all available STEPs and nationally representative studies in LMICs from 2008 – April 2020. These STEPS surveys included: 2016 Algeria, 2017 Azerbaijan, 2016 Belarus, 2015 Benin, 2014 Bhutan, 2014 Botswana, 2013 Burkina Faso, 2010 Cambodia, 2011 Comoros, 2010 Costa Rica, 2010 Eritrea, 2014 Eswatini, 2016 Georgia, 2016 Guyana, 2016 Iran, 2015 Iraq, 2015 Kenya, 2015 Kiribati, 2013 Kyrgyzstan, 2013 Laos, 2017 Lebanon, 2012 Lesotho, 2011 Liberia, 2013 Moldova, 2013 Mongolia, 2017 Morocco, 2014 Myanmar, 2013 Nepal, 2012 Rwanda, 2013 Samoa, 2009 Sao Tome and Principe, 2015 Solomon Islands, 2013 St. Vincent & the Grenadines, 2015 Sudan, 2016 Tajikistan, 2012 Tanzania, 2014 Timor Leste, 2010 Togo, 2015 Tuvalu, 2014 Uganda, 2011 Vanuatu, 2015 Vietnam, 2017 Zambia, and 2011 Zanzibar.

To assemble estimates for high-income countries, we searched Google Scholar. For estimates of diagnosed diabetes, we searched using the following terms: "[county name]" AND survey AND diabetes AND ("population-based" OR "nationally representative") AND ("diagnosed" OR "undiagnosed"). For glycaemic control, we searched: "[county name]" AND survey AND ("population-based" OR "nationally representative") AND (diabetes) AND (("HbA_{1c}" OR "A1C" OR "glycemic" OR "glycaemic") AND control). For blood pressure control, we searched: "[county name]" AND survey AND (diabetes) AND ("population-based" OR "nationally representative") AND (("blood pressure" OR hypertension) AND "control"). For statin use, we searched: "[county name]" AND survey AND ("population-based" OR "nationally representative") AND (diabetes) AND ("statin" OR "lipid-lowering drug"). We then applied the following inclusion criteria:

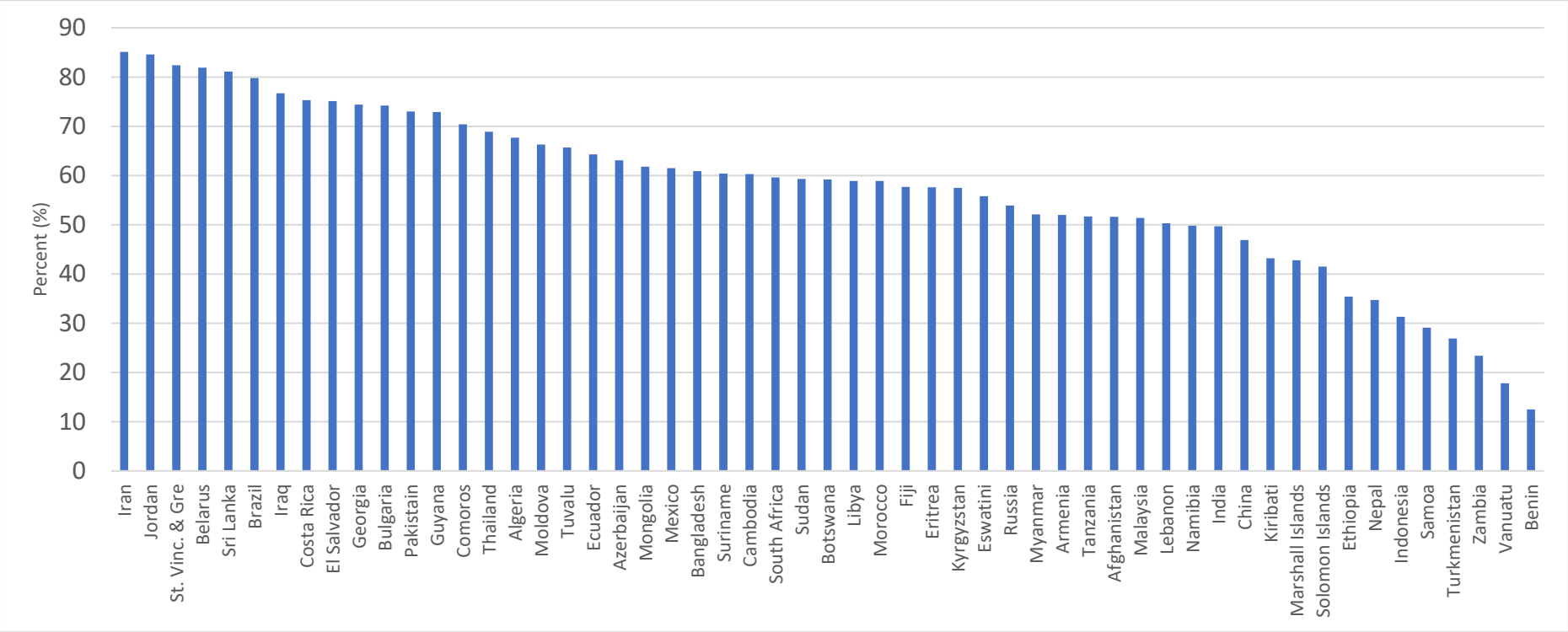
- Published on or after January 2010; when two surveys were available the most recent was used
- Data collected at the individual-level or used electronic health records
- The survey was conducted in one of the WHO member states
- The survey or study was nationally representative
- The survey had a response rate of >80%
- Survey measured a biomarker for diabetes: glycated haemoglobin (HbA_{1c})
- Contained data on at least one core metric, defined in this paper ensuring identical denominators.

Because the number of sub-samples with diagnosed diabetes were low for some surveys, we have only reported estimates wherein the total number of cases of diabetes is at least 150, and for estimates of HbA_{1c}, blood pressure, and statin use, where the number of diagnosed cases is at least 150. For the complementary metrics, we also assembled data from previously published reviews of diabetes incidence, all-cause and cardiovascular mortality, and incidence of diabetes-related complications.[6-8] For high-income countries, we relied on a search of published sources containing levels for the metrics specified as selected for *the Compact*. Thus, estimates are derived from a combination of STEPs and other nationally representative surveys conducted between 2009-2019 with strong response rates (74-96%) and sample sizes of ~2000-5000 in most surveys.[2,3]

We defined diabetes as use of a glucose-lowering drug (oral drugs or insulin) or an elevated biomarker meeting the WHO's criteria for diabetes: fasting plasma glucose (FPG) ≥7.0 mmol/L (126 mg/dL), random plasma glucose ≥11.1 mmol/L (200 mg/dL), or HbA_{1c} ≥6.5%. In surveys reporting uncalibrated capillary glucose measurements, we converted values to plasma glucose by multiplying by a factor of 1.11 based on evidence that capillary values underestimates plasma values.[9] This conversion is standard in large-scale population-based diabetes studies. Please also see our prior work in which we have extensively documented details of the biological measurements in each survey.[2-4,10]

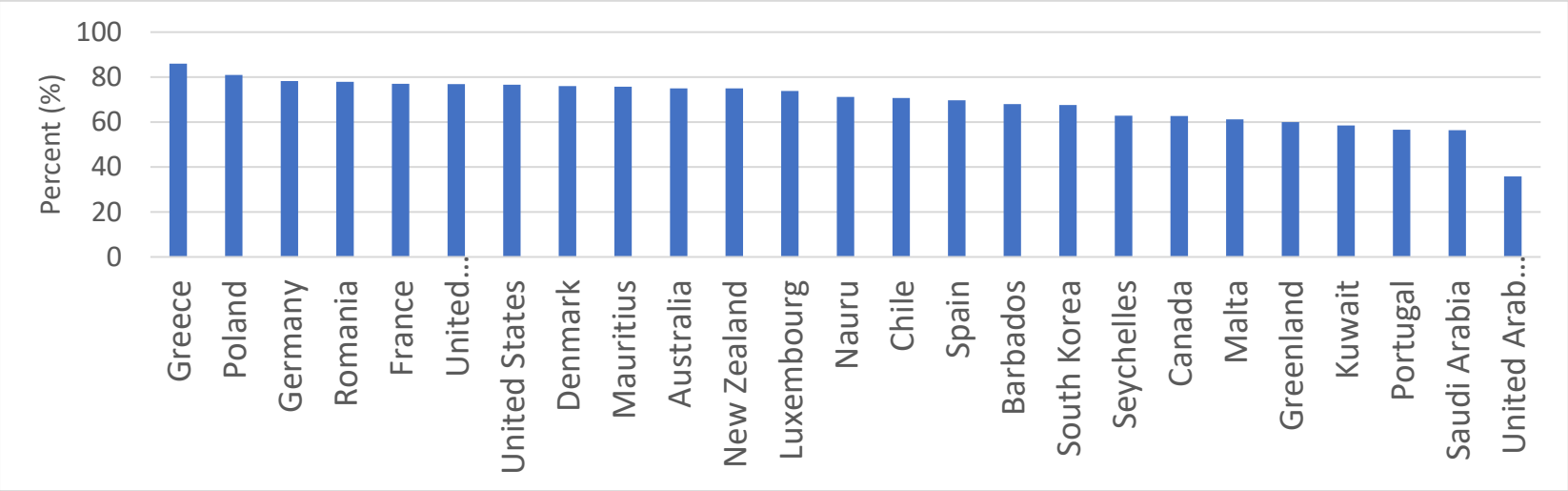
Limitations of our search: We only used the first 50 English language results from Google Scholar. Grey literature was not directly searched and only included if readily available or linked in a similar journal article. Due to the precise nature of the indicators required, articles were excluded due to their non-random sampling methods, non-representative populations, or variations in the denominators. Often the search strategy produced papers whereby the denominator was hypertensive patients, and the numerator was individuals with diabetes rather than the converse.

Figure S2: Proportions of adults with diabetes who are diagnosed from low- and middle-income countries.



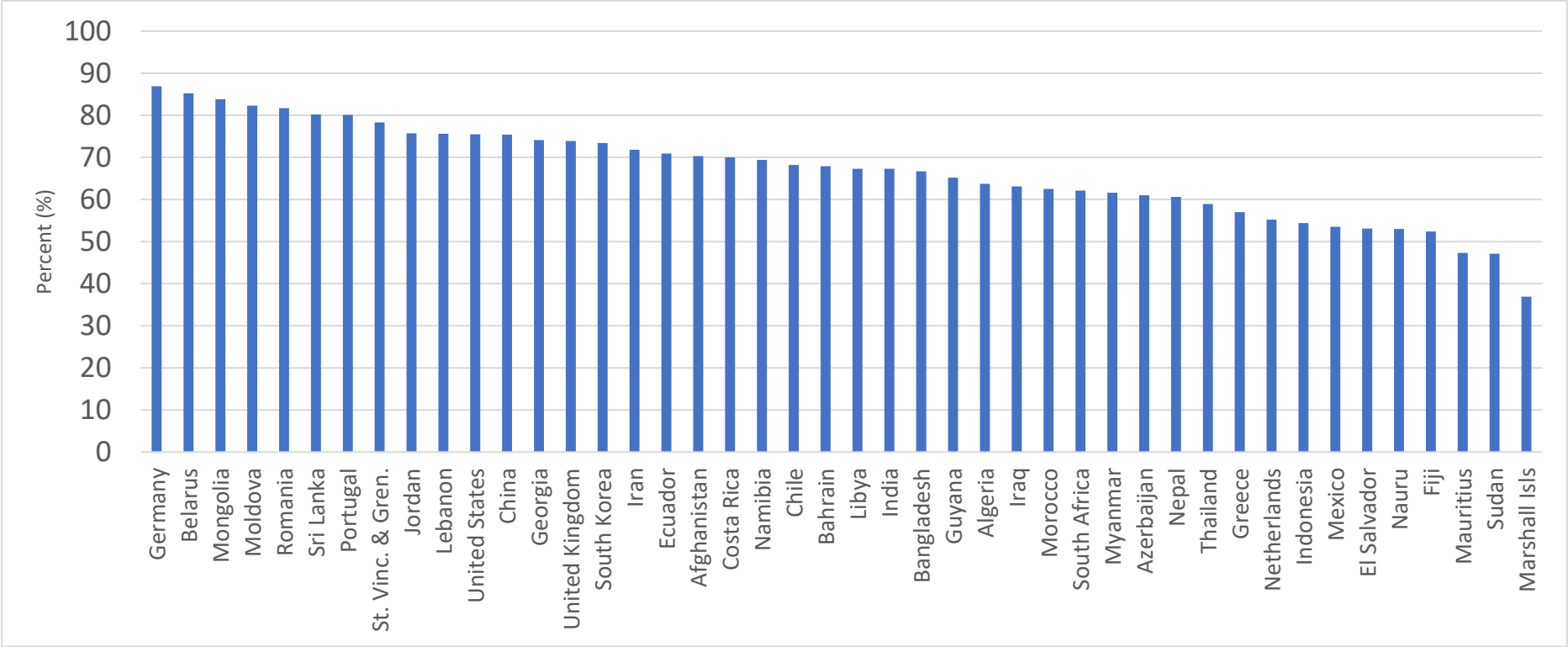
Data only shown for surveys with sample size of persons with diabetes ≥ 150. Diabetes defined as use of a glucose-lowering drug (oral glucose-lowering drugs or insulin) or an elevated biomarker meeting the WHO's criteria for diabetes: fasting plasma glucose (FPG) ≥7.0 mmol/L (126 mg/dL), random plasma glucose ≥11.1 mmol/L (200 mg/dL), or glycated haemoglobin (HbA_{1c}) ≥6.5%.
References for Figure S2: [11-17]

Figure S3: Proportions of adults with diabetes who are diagnosed from high-Income countries.



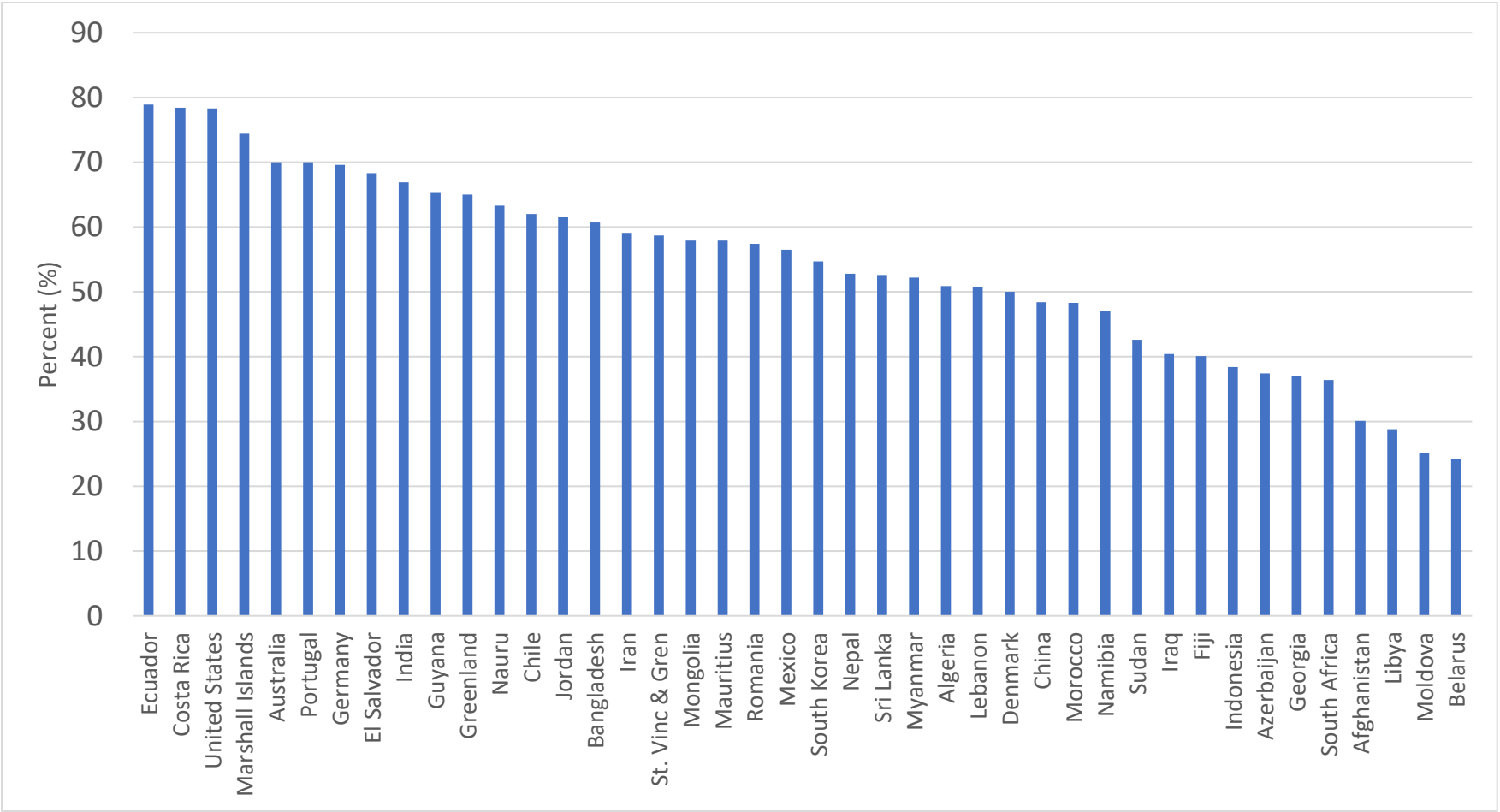
Data only shown for surveys with sample size of persons with diabetes ≥ 150. Diabetes defined as use of a glucose-lowering drug (oral glucose-lowering drugs or insulin) or an elevated biomarker meeting the WHO's criteria for diabetes: fasting plasma glucose (FPG) ≥7.0 mmol/L (126 mg/dL), random plasma glucose ≥11.1 mmol/L (200 mg/dL), or glycated haemoglobin (HbA_{1c}) ≥6.5%.
References for Figure S3: [18-35]

Figure S4: Proportion of adults with diagnosed diabetes with HbA_{1c} < 8.0%.



Data only shown for surveys with sample size of persons with diabetes ≥ 150. Diabetes defined as use of a glucose-lowering drug (oral glucose-lowering drugs or insulin) or an elevated biomarker meeting the WHO's criteria for diabetes: fasting plasma glucose (FPG) ≥7.0 mmol/L (126 mg/dL), random plasma glucose ≥11.1 mmol/L (200 mg/dL), or glycated haemoglobin (HbA_{1c}) ≥6.5%.
References for Figure S4: [20,36-42]

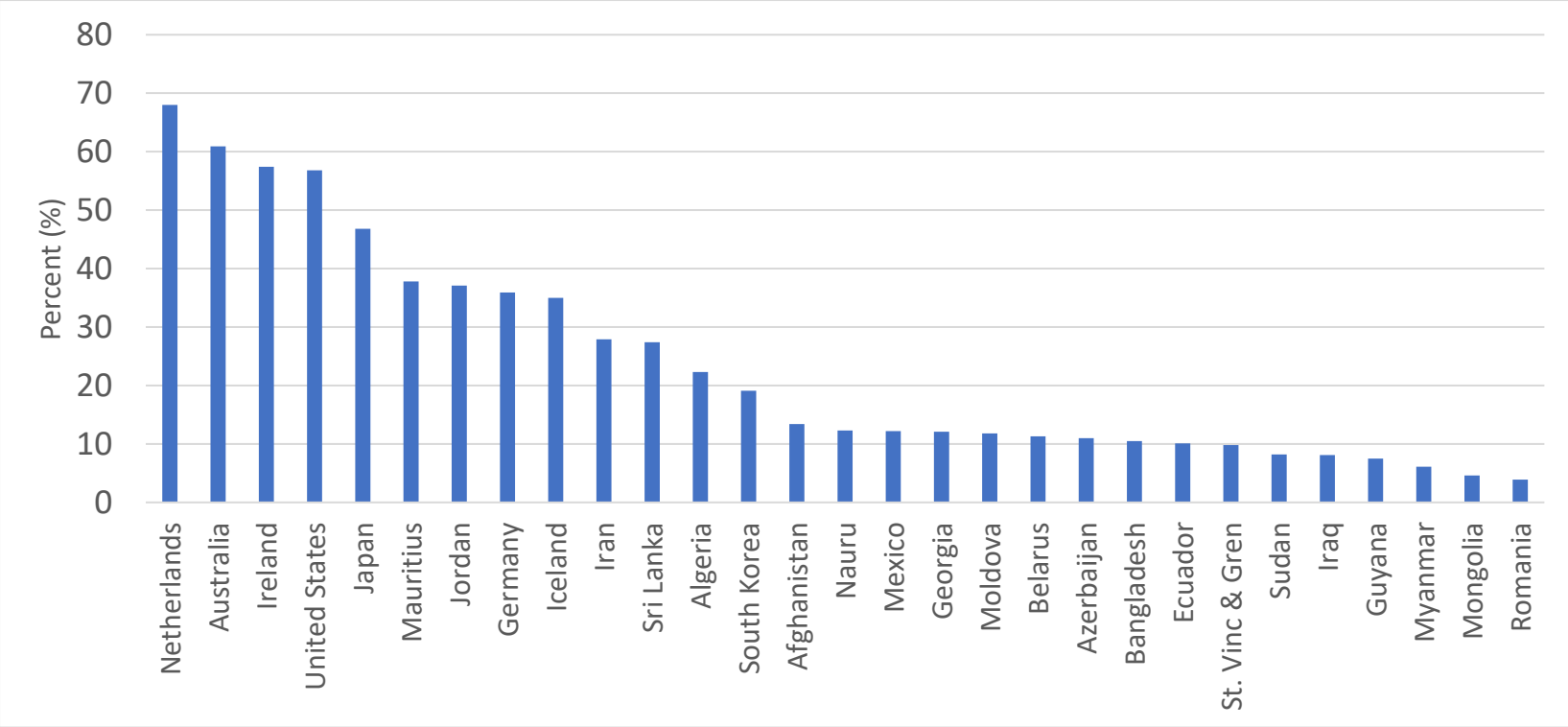
Figure S5: Proportion of adults with diagnosed diabetes with blood pressure < 140/90 mmHg.



Data only shown for surveys with sample size of persons with diabetes≥150. Diabetes defined as use of a glucose-lowering drug (oral glucose-lowering drugs or insulin) or an elevated biomarker meeting the WHO's criteria for diabetes: fasting plasma glucose (FPG) ≥7.0 mmol/L (126 mg/dL), random plasma glucose ≥11.1 mmol/L (200 mg/dL), or glycated haemoglobin (HbA_{1c}) ≥6.5%.

References for Figure S5: [20431,36,42-45F]

Figure S6: Proportion of adults with diagnosed diabetes taking a statin.



Data only shown for surveys with sample size of persons with diabetes ≥ 150. Diabetes defined as use of a glucose-lowering drug (oral glucose-lowering medication or insulin) or an elevated biomarker meeting the WHO's criteria for diabetes: fasting plasma glucose (FPG) ≥7.0 mmol/L (126 mg/dL), random plasma glucose ≥11.1 mmol/L (200 mg/dL), or glycated haemoglobin (HbA_{1c}) ≥6.5%. References for Figure S6: [42,46-48] [36] [49] [50] **[49-51]**

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