Comparison of essential medicines lists in 137 countries
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Objective To compare the medicines included in national essential medicines lists with the World Health Organization’s (WHO’s) Model list of essential medicines, and assess the extent to which countries’ characteristics, such as WHO region, size and health care expenditure, account for the differences.

Methods We searched the WHO’s Essential Medicines and Health Products Information Portal for national essential medicines lists. We compared each national list of essential medicines with both the 2017 WHO model list and other national lists. We used linear regression to determine whether differences were dependent on WHO Region, population size, life expectancy, infant mortality, gross domestic product and health-care expenditure.

Findings We identified 137 national lists of essential medicines that collectively included 2068 unique medicines. Each national list contained between 44 and 983 medicines (median 310; interquartile range, IQR: 269 to 422). The number of differences between each country’s essential medicines list and WHO’s model list ranged from 93 to 815 (median: 296; IQR: 265 to 381). Linear regression showed that only WHO region and health-care expenditure were significantly associated with the number of differences (adjusted R²: 0.33; P < 0.05). Most medicines (1248, 60%) were listed by no more than 10% (14) of countries.

Conclusion The substantial differences between national lists of essential medicines are only partly explained by differences in country characteristics and thus may not be related to different priority needs. This information helps to identify opportunities to improve essential medicines lists.

Introduction
More than 5 billion people live in countries that use essential medicines lists. These lists typically contain hundreds of medicines intended to meet the priority health-care needs of a population.1–3 Since the World Health Organization (WHO) published the first Model list of essential medicines in 1977, the list has been revised every two years and adapted to circumstances in more than one hundred countries. Governments and health-care institutions use essential medicines lists to determine which medicines to fund, stock, prescribe and dispense.4 As essential medicines lists influence the medicines that people have access to, contents of these lists constitute important determinants of health worldwide.

Countries must select medicines for their essential lists appropriately to facilitate sustainable, equitable access to medicines and promote their appropriate use.4 Since a country’s list is intended to meet the needs of its population, countries that are geographically close or similar to each other in population size, health-care expenditure and health status might be expected to have similar essential medicines lists. Differences between such lists that are not explained by differences in country-specific needs may represent opportunities for improving the lists.

Here we aimed to compare the medicines included in national essential medicines lists with the 2017 WHO’s Model list of essential medicines,5 and to determine whether characteristics, such as WHO Region, population size, and health-care expenditure account for the differences.

Abstracts in العربية, 中文, Français, Русский and Español at the end of each article.
differences in the lists and that are widely available and commonly used in international comparisons: WHO region; population size; life expectancy; infant mortality; gross domestic product (GDP) per capita; health-care expenditure per capita; GINI index as a measure of income inequality; and the corruption perception index. In June 2017, we extracted data on WHO Region and per capita health-care expenditure from the WHO Global Health Observatory, the most recent information available at the time.8 We extracted data on population, life expectancy, infant mortality and GDP per capita from the Central Intelligence Agency’s World Factbook.9 We obtained the GINI index from the most recent data available from the World Bank in the United Nations Human Development Report 2016.10 We retrieved the corruption perception score from Transparency International’s 2016 corruption perceptions index.11

Data extraction

From each country’s list we abstracted medicines using International Nonproprietary Names (INNs).12 For medicines whose names were not in English, we used the Anatomical Therapeutic Chemical classification system,13 if available, or translated the names using Google Translate.14 We listed each medicine individually, whether it was part of a combination product or not. We treated medicine bases and their salts (e.g. promethazine hydrochloride and promethazine) as the same medicines, as well as different compounds of the same vitamin or mineral (e.g. ferrous fumarate and ferrous sulfate).

We used the Anatomical Therapeutic Chemical code for each medicine and the Anatomical Therapeutic Chemical structure to determine the level of relatedness between medicines: level 1, anatomical main group (e.g. metformin is “A” for alimentary tract); level 2, therapeutic subgroup (e.g. metformin is “A10” for alimentary tract medicines used to treat diabetes); level 3, pharmacological subgroup (e.g. metformin is “A10B” for alimentary tract medicines used to treat diabetes that lower blood glucose); level 4, chemical subgroup (e.g. metformin is “A10BA” for alimentary tract medicines used to treat diabetes that lower blood glucose that are biguanides).15 WHO’s model list includes (with a square box) that some listed medicines are merely exemplars of several medicines that should be considered therapeutically equivalent.1 We assumed that the medicines in the same chemical subgroup as the exemplar were equivalent (e.g. enalapril is equivalent to all other in the chemical subgroup C09A: captopril, lisinopril, perindopril, ramipril, quinapril, benazepril, cilazapril, fosinopril,trandolapril, spirapril, delapril, moexipril, temocapril, zofenopril and imidapril), except when WHO’s list specified particular equivalent medicines (e.g. bisoprolol is specified as equivalent to atenolol, metoprolol, and carvedilol). As a result of uncertainty whether these medicines are truly equivalent, and because we do not know how countries interpreted the indications of equivalence, or if they used them at all, we also report results disregarding the equivalence to exemplars.

Data analysis

For descriptive data, we calculated medians with interquartile ranges (IQRs).

Comparison with WHO’s model list

To determine whether countries’ characteristics accounted for differences between each country’s list and the 2017 WHO model list, we created a linear regression model with the total number of differences from the WHO’s model list as the dependent variable and the following characteristics as independent variables: WHO region, population size, life expectancy; infant mortality; GDP per capita, and health-care expenditure per capita. We had to exclude the variables inequality and corruption perception, since only 95 (69 %) countries had available information. We present the adjusted $R^2$ values for the number of independent variables. We conducted several post-hoc sensitivity analyses: removed longer lists to assess the effect of outliers, employed the Tanimoto coefficient that accounts for list length and used the 2015 WHO model list instead of the 2017 list as a reference to allow for a delay in updating national lists.16 We used R statistical package (R Foundation, Vienna, Austria).

Country comparisons

To calculate a similarity score, we divided medicines into those that are commonly listed (by at least 50% of countries) and those that are uncommonly listed (by less than 50% of countries). For each country’s list we calculated the score by counting the medicines on that list that are commonly listed and subtracting the number of uncommonly listed medicines. This calculation provides a similarity integer score for each country; positive scores indicate that most medicines in the country’s list are commonly listed in other countries’ lists, and negative scores indicate that most medicines are uncommonly listed in other countries’ lists.

Data sharing

The underlying data used in this study are publicly available and, separately, a database with updated information about national essential medicines lists will be maintained online.17,18

Results

We identified essential medicines lists posted on the WHO repository for 137 countries (70% of 195 countries). The total number of medicines on each country’s list ranged from 44 to 983 (median: 310; IQR: 269 to 422). In total we identified 2068 unique medicines.

Table 1 (available at: http://www.who.int/bulletin/volumes/97/6/18-222448) presents the characteristics of the included countries.

Fig. 1 shows the relationship between the number of essential medicines listed by each country and GDP. Most countries with a lower GDP had shorter national lists of essential medicines, but there were many exceptions. Sweden has a high GDP and relatively short list while Syrian Arab Republic has a low GDP and a relatively long list. Medicines in each country’s list can be found in a data repository.17,19

Comparison with WHO’s model list

Of the 414 eligible medicines on WHO’s model list, 73 (18%) medicines were listed by only 27 (20%) or fewer countries and 23 (6%) medicines were listed by 7 (5%) or fewer countries. Medicines recently added to WHO’s model list were generally listed by fewer countries than those medicines added earlier (available from a data repository).20 Only velpatasvir, a Hepatitis C treatment, which was added to the 2017 WHO model list, was not listed by any country. No country included all medicines on WHO’s model list; eight countries included over 300 WHO essential medicines on their list (Ethiopia, Iran [Islamic Republic of], Kenya, Pakistan, Republic of Moldova, Slovakia, Syrian Arab Republic and Thailand). Of these, Kenya, Pakistan and
the Republic of Moldova listed WHO essential medicines without adding many (less than 150) other medicines. Portugal, Slovakia and Syrian Arab Republic added more than 600 medicines to their list that were not on WHO’s model list; while Angola, Bosnia and Herzegovina, Bulgaria, Cambodia and Somalia omitted more than 300 WHO essential medicines.

The numbers of differences between each country’s list and WHO’s model list ranged from 85 to 533 (median: 252; IQR: 227 to 303) or, when equivalence to exemplars was disregarded, from 93 to 815 differences (median: 296; IQR: 265 to 381). There were differences across therapeutic areas and for both communicable and noncommunicable diseases (available from a data repository).19

Fig. 2 and Fig. 3 show the relationship between countries’ health-care expenditure and essential medicines. Countries with lower health-care expenditures appear to have omitted more medicines from their lists that are on WHO’s model list (e.g. Angola and Cambodia), and countries with higher health-care expenditures appear to have included more medicines on their lists that are not on WHO’s model list (e.g. Portugal and Slovakia), although exceptions exist (e.g. Sweden).

The numbers of differences varied considerably within different WHO regions (Fig. 4). The differences between each country’s list and WHO’s model list across therapeutic areas were less when we consider equivalence based on Anatomical Therapeutic Chemical codes (Fig. 5). Algeria, Iran (Islamic Republic of), Mexico and Viet Nam are examples of countries listing large numbers of alternatives to the substances selected by WHO.

For the regression model, we included 136 countries. We excluded the country of Niue because of missing information. The multivariate linear regression indicated that the six included country characteristics explained one-third of the numbers of differences between each country’s list and WHO’s model list (adjusted $R^2$: 0.33); WHO region (more differences in the Americas) and health-care expenditure (more differences with higher expenditures) were significantly associated with the total number of differences ($P = 0.023$; available in a data repository).19 To determine if the main finding (that is, most of the variation in the number of differences was not explained by these country characteristics) depended on the definitions used in the pre-specified analysis, we conducted post-hoc sensitivity analyses. Excluding 17 countries with longer lists that may have been comprehensive formularies rather than essential medicines lists, although they were posted in the essential medicines lists repository, slightly increased the amount of variation in the number of differences explained by the country characteristics ($R^2$: 0.37). Since long national lists will have many differences from WHO’s model list, we performed a sensitivity analysis accounting for list length using the Tanimoto coefficient and the $R^2$ decreased to 0.23 indicating that the main finding is not due to list length. Performing the same analyses using the 2015 WHO model list as the reference, rather than the 2017 version, showed no differences (median of the numbers of differences: 272; IQR: 244 to 367; $R^2$: 0.33).

**Between country comparisons**

The similarity scores for countries, measuring the extent to which countries tend to list medicines commonly listed by other countries, ranged from –553...
Fig. 2. Health expenditure and dissimilarities between national lists of essential medicines and the 2017 WHO Model list of essential medicines

On WHO’s model list, but not on national list

On national list, but not on WHO’s model list

Fig. 3. Health expenditure and similarities between national lists of essential medicines and the 2017 WHO Model list of essential medicines

On WHO’s model list, but not on national list

On national list, but not on WHO’s model list

WHO: World Health Organization.

Notes: The size of the circles represents the country’s health-care expenditure. We obtained the countries’ three letter codes from the International Organization for Standardization (ISO) 3166–1 Online Browsing Platform; AGO: Angola; ALB: Albania; ARG: Argentina; ARM: Armenia; BDG: Bangladesh; BGR: Bulgaria; BHN: Bosnia and Herzegovina; BLR: Belarus; BRA: Brazil; BRB: Barbados; COL: Colombia; CUB: Cuba; CZE: Czechia; DOM: Dominican Republic; DZA: Algeria; ECU: Ecuador; EGY: Egypt; EST: Estonia; ETH: Ethiopia; GMB: Gambia; HRV: Croatia; HTI: Haiti; IRI: Iran; KHM: Cambodia; LIB: Libya; LVA: Latvia; MDA: Republic of Moldova; MDV: Maldives; MEX: Mexico; MHL: Marshall Islands; MKD: North Macedonia; MLT: Malta; MNE: Montenegro; MOZ: Mozambique; NAM: Namibia; Niu: Nitu; OMN: Oman; PAK: Pakistan; PER: Peru; PHL: Palau; POL: Poland; PR: Portugal; ROU: Romania; SDN: Sudan; SOM: Somalia; SRI: Sri Lanka; SVN: Slovenia; TUN: Tunisia; TUV: Tuvalu; URY: Uruguay; VNM: Viet Nam; VUT: Vanuatu. Not all country codes are shown to make this figure more readable; data for all countries are provided in Table 1.
Fig. 4. Differences between national lists of essential medicines and the 2017 WHO Model list of essential medicines

Notes: Differences mean that either a medicine is included on WHO’s model list, but not in that country’s list or a medicine is included on the country’s list, but not on WHO’s model list. No data indicates that no essential medicines list was found in the repository for that country.
Fig. 5. Differences between national lists of essential medicines and WHO’s Model list of essential medicines when medicines in the same chemical subgroup are considered equivalent, 2017

Notes: Differences mean that either a medicine is included on WHO’s model list, but not in that country’s list or a medicine is included on the country’s list, but not in WHO’s model list. We used the Anatomical Therapeutic Chemical classification system to assess equivalence. No data indicates that no essential medicines list was found in the repository for that country.
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Table 2. Most common medicines in countries’ lists of essential medicines, 2017

| Medicine (synonym) | No. of countries list (%) |
|-------------------|---------------------------|
| Acetazolamide      | 120 (88)                  |
| Acetylsalicylic acid | 131 (96)                |
| Acyclovir          | 129 (94)                  |
| Albendazole        | 112 (82)                  |
| Allopurinol        | 131 (96)                  |
| Amiodarone         | 118 (86)                  |
| Amitriptyline      | 127 (93)                  |
| Amoxicillin        | 137 (100)                 |
| Ampicillin         | 126 (92)                  |
| Atenolol           | 127 (93)                  |
| Atropine           | 127 (93)                  |
| Azithromycin       | 112 (82)                  |
| Beclometasone (Beclomethasone) | 119 (87) |
| Benzylpenicillin (Penicillin G) | 117 (85) |
| Betamethasone      | 126 (92)                  |
| Bupivacaine        | 116 (85)                  |
| Calcium            | 125 (91)                  |
| Carbamazepine      | 134 (98)                  |
| Carbidopa          | 116 (85)                  |
| Ceftriaxone        | 118 (86)                  |
| Chloramphenicol    | 117 (85)                  |
| Chlorpromazine     | 119 (87)                  |
| Ciprofloxacin      | 133 (97)                  |
| Clavulanic acid    | 116 (85)                  |
| Cyclophosphamide   | 114 (83)                  |
| Dexamethasone      | 131 (96)                  |
| Diazepam           | 135 (99)                  |
| Diclofenac         | 121 (88)                  |
| Digoxin            | 132 (96)                  |
| Dopamine           | 113 (82)                  |
| Doxycycline        | 135 (99)                  |
| Efavirenz          | 111 (81)                  |
| Epinephrine (Adrenaline) | 128 (93) |
| Erythromycin       | 126 (92)                  |
| Ethambutol         | 126 (92)                  |
| Ethinylestradiol   | 117 (85)                  |
| Fentanyl           | 113 (82)                  |
| Ferrous fumarate   | 131 (96)                  |
| Fluconazole        | 125 (91)                  |
| Folic acid         | 132 (96)                  |
| Furosemide         | 133 (97)                  |
| Gentamicin         | 133 (97)                  |
| Gilbenclamide (Glyburide) | 122 (89) |
| Haloperidol        | 130 (95)                  |
| Heparin            | 125 (91)                  |
| Hydrochlorothiazide| 130 (95)                  |
| Hydrocortisone     | 133 (97)                  |
| Ibuprofen          | 130 (95)                  |
| Insulin, long acting | 115 (84)               |
| Insulin, short acting | 135 (99)               |
| Isoniazid          | 127 (93)                  |
| Isosorbide dinitrate | 119 (87)             |
| Ketamine           | 113 (82)                  |

(continues...) to 153 (median: 80; IQR: −45 to 115; Table 1). Most of the medicines were listed by a relatively small proportion of the countries; 60% (1248/2068) of the medicines were listed by 10% (14) of the countries. Of these 1248 medicines, 250 (20%) were in the same main therapeutic area or the same anatomical subgroup as the closest related medicine on WHO’s model list; 349 (28%) medicines were in the same pharmacological subgroup as the most closely related medicine on WHO’s model list, 611 (49%) medicines were in the same chemical subgroup as the most closely related medicine on WHO’s model list, 611 (49%) medicines were in the same chemical subgroup as the most closely related medicine on WHO’s model list, 30 (2%) medicines were on WHO’s model list, and 8 (1%) medicines could not be classified. The most commonly listed medicines are shown in Table 2. Amoxicillin was listed by all countries and diazepam, doxycycline, short-acting insulin, salbutamol, and metronidazole were each listed by 99% of countries.

We examined medicines that were expected to be listed by only a small number of countries. There were six treatments for trypanosomiasis (pentamidine, suramin sodium, eflornithine, melarsoprol, nifurtimox, benznidazole) and four antileishmaniasis medicines (amphotericin B, miltefosine, paromomycin, sodium stibogluconate) on WHO’s model list. These medicines were listed by between eight and 96 countries (median: 12; IQR 9 to 24; more information available in a data repository).19

Discussion

We found substantial differences in essential medicines lists. Most national lists of essential medicines had more than 200 differences compared with WHO’s model list. These differences were only partly explained by the countries’ characteristics we investigated. Most of the medicines were listed by a small number of countries. Decision-makers could choose to re-examine whether medicines listed by a small number of other countries should be removed from their national list. Previous studies have compared many national lists of essential medicines, but for only one therapeutic area. For example, in one study on medications for neuropathic pain listed in the essential medicines lists of 112 countries, only four of 18 differences (22%) were related to country income.20 Gabapentinoids, that can be
used to treat neuropathic pain, were more likely to be listed in high-income countries, although the efficacy of these medicines is questionable.\textsuperscript{21,22} Other studies have compared lists of several countries for specific populations. For instance, comparing lists for paediatric populations have shown that the Indian and South African essential medicines lists may take better account of the needs of children compared with the Chinese list.\textsuperscript{21} The findings of these studies are consistent with our study, and also suggest that differences in the lists are not explained by countries’ characteristics, implying there may be opportunities to improve essential medicines lists.

Our study has limitations. We abstracted the medicines in each country's list of essential medicines from the information posted on WHO’s website, a process that was liable to errors, as documents describing essential medicines lists had to be translated, standard medicine names were not consistently used, and judgements had to be made about what to include in ambiguous cases. In the future, stakeholders could validate and update the information in the data set used for this study and also provide information about how they are using the essential medicines list to the database of global essential medicines.\textsuperscript{18} Some of the lists included in this study may not be used by the respective countries. Furthermore, the country characteristics we included may not fully capture important features. We relied on the widely used Anatomical Therapeutic Chemical classification system, which like other classifications systems, assigns some medicines with multiple codes for different indications and does not include every medicine in use.

In 2004, WHO stated that the lack of access to essential medicines remains one of the most serious global public health problems and identified the "careful selection of essential medicine [as] the first step in ensuring access."\textsuperscript{24} The importance of essential medicines lists will probably grow as countries move towards universal health coverage, as a part of achieving the sustainable development goals.\textsuperscript{25} Our findings suggest that greater care may be needed in selecting medicines that meet the priority health-care needs of populations. The reasons for the substantial differences from WHO's model list and the differences between countries should be further studied. Governments could provide explanations for medicines they have decided to add to help other countries decide if they should also list them. Countries could also use the database of global essential medicines created for this study to flag medicines that are not listed by similar countries or in WHO's model list.\textsuperscript{18} There may be gaps in the information available to countries about the medicines on WHO’s model list includ-

\begin{table}[h]
\centering
\begin{tabular}{lcc}
\hline
Medicine (synonym) & No. of countries list (%) & n = 137 \\
\hline
Lamivudine & 120 (88) & \\
Levodopa & 127 (93) & \\
Levonorgestrel & 112 (82) & \\
Levothyroxine & 130 (95) & \\
Lidocaine (Lignocaine) & 134 (98) & \\
Magnesium & 127 (93) & \\
Mannitol & 113 (82) & \\
Medroxyprogesterone & 119 (87) & \\
Metformin & 133 (97) & \\
Methotrexate & 126 (92) & \\
Methyl dopa & 123 (90) & \\
Metoclopramide & 127 (93) & \\
Metronidazole & 136 (99) & \\
Morphine & 130 (95) & \\
Naloxone & 117 (85) & \\
Neostigmine & 119 (87) & \\
Nifedipine & 128 (93) & \\
Nitroglycerin (Glycerol trinitrate) & 120 (88) & \\
Nystatin & 127 (93) & \\
Omeprazole & 127 (93) & \\
Oxytocin (Pitocin) & 123 (90) & \\
Paracetamol (Acetaminophen) & 133 (97) & \\
Penicillin G Benzathine & 119 (87) & \\
Phenobarbital & 131 (96) & \\
Phenytoin & 118 (86) & \\
Pilocarpine & 123 (90) & \\
Potassium & 128 (93) & \\
Prednisolone & 130 (95) & \\
Propranolol & 129 (94) & \\
Pyrazinamid & 126 (92) & \\
Ranitidine & 125 (91) & \\
Rifampicin & 129 (94) & \\
Salbutamol & 135 (99) & \\
Spirala lactone & 131 (96) & \\
Streptomycin & 117 (85) & \\
Sulfamethoxazole & 130 (95) & \\
Suxamethonium & 111 (81) & \\
Tamoxifen & 116 (85) & \\
Tetanus vaccine & 115 (84) & \\
Timolol & 126 (92) & \\
Trimethoprim & 132 (96) & \\
Valproic acid (Sodium valproate, Valproate, Valproate semisodium) & 127 (93) & \\
Verapamil & 118 (86) & \\
Vitamin B1 (Thiamine) & 118 (86) & \\
Vitamin B12 (Cobalamin) & 125 (91) & \\
Vitamin B6 (Pyridoxine) & 125 (91) & \\
Vitamin K (Menadione, Phytonadione, Phytonadione) & 122 (89) & \\
Zidovudine (Retrovir) & 118 (86) & \\
\hline
\end{tabular}
\caption{Note: We classified medicines listed in more than 80% of national lists as common.}
\end{table}
Méthodes, We thank Richard Stevens and Mei-Man Lee of the Nuffield Department of Primary Care Health Sciences, University of Oxford, United Kingdom of Great Britain and Northern Ireland. NP is supported by the Department of Family and Community Medicine, St Michael’s Hospital and the Department of Family and Community Medicine, University of Toronto, Canada, which is designated the WHO Collaborating Centre on Family Medicine and Primary Care.

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Competing interests: NP reports grants from Canadian Institutes for Health Research, the Ontario SPOR Support Unit, the Canada Research Chairs program and Physicians Services Incorporated during the conduct of the study. JKA has co-authored and edited textbooks and written reviews, commentaries, and medico-legal reports on various aspects of prescribing, and has sometimes received remuneration. AP reports grants from NIHR, grants from NIHR School of Primary Care Research, during the undertaking of the study; and occasionally receives expenses for teaching Evidence-Based Medicine. CH has received expenses and fees for his media work. CH has received expenses from WHO and holds grant funding from the NIHR Oxford BRC, the NIHR School of Primary Care Research, and is a NIHR Senior Investigator. On occasion, CH receives expenses for teaching EBM and is also paid for his GP work in NHS out of hours. All other authors declare no competing interests.

Results 我们确定了 137 国的基本药物清单，这些清单共计包括2068种独特药物。各国清单包含44至983种药物（中值：310；四分位距：IQR：269至422）。各 国基本药物清单与世卫组织标准清单间的差异数值范围为93至815（中值：296；IQR：265至381）。线性回归显示，仅世卫组织区域和医疗保健支出与差异数值显著相关（调整后的 R²：0.33；P < 0.05）。仅有不超过10%的国家（14个）将大多数药物（1248种；占60%）列入清单。

Conclusion 国家特征差异只是国家基本药物清单之间实质性差异的部分原因，因此，这可能与不同的优先需求无关。此类信息有助于改进基本药物清单的机会。
Comparaison des listes des médicaments essentiels de 137 pays

Objectif Comparer les médicaments inclus dans les listes nationales des médicaments essentiels avec la Liste modél de l’Organisation mondiale de la Santé (OMS) des médicaments essentiels, et déterminer dans quelle mesure les caractéristiques des pays, comme la région OMS, la taille et les dépenses de soins de santé, expliquent les différences.

Méthodes Nous avons recherché des listes nationales des médicaments essentiels sur le Portail d’information – Médicaments essentiels et produits de santé de l’OMS. Nous avons comparé chaque liste nationale des médicaments essentiels avec la Liste modél de l’OMS de 2017 et d’autres listes nationales. Nous avons utilisé une régression linéaire pour déterminer si les différences dépendaient de la région OMS, de la taille de la population, de l’espérance de vie, de la mortalité infantile, du produit intérieur brut et des dépenses de soins de santé.

Résultats Nous avons sélectionné 137 listes nationales des médicaments essentiels qui contenaient au total 2068 médicaments différents. Chaque liste nationale recensait entre 44 et 983 médicaments (médiane : 310, intervalle interquartile, IQR: de 269 à 422). Le nombre des différences entre la liste des médicaments essentiels de chaque pays et la Liste modél de l’OMS variait entre 93 et 815 (médiane : 296; IQR : de 265 à 381). La régression linéaire a montré que seules la région OMS et les dépenses de soins de santé étaient clairement associées au nombre des différences (R² ajusté : 0,33, P < 0,05). La plupart des médicaments (1248; 60%) étaient listés par 10% (14) des pays, pas plus.

Conclusion Les différences importantes entre les listes nationales des médicaments essentiels s’expliquent seulement en partie par des différences au niveau des caractéristiques des pays et ne sont donc pas forcément liées à différents besoins prioritaires. Ces informations aident à identifier des possibilités d’améliorations des listes des médicaments essentiels.
Table 1. National lists of essential medicines in 137 countries

| Country                  | GDP per capita in 2017, Intl $ | Health expenditure per capita in 2014, Intl $ | Year of list | Total no. of medicines on list | Similarity with WHO Model List, no. (%)a | Dissimilarity with WHO Model List, no.b | Similarity score |
|--------------------------|--------------------------------|-----------------------------------------------|--------------|--------------------------------|------------------------------------------|----------------------------------------|-----------------|
| Afghanistan              | 2 000                          | 167                                           | 2014         | 258                            | 196 (78)                                 | 62                                      | 104             |
| Albania                  | 12 500                         | 615                                           | 2011         | 214                            | 121 (57)                                 | 93                                      | 26              |
| Algeria                  | 15 200                         | 932                                           | 2016         | 445                            | 161 (36)                                 | 284                                     | −145            |
| Angola                   | 6 800                          | 239                                           | 2008         | 64                             | 51 (80)                                  | 13                                      | 40              |
| Antigua and Barbuda      | 26 400                         | 1208                                          | 2007         | 292                            | 208 (71)                                 | 84                                      | 140             |
| Argentina                | 20 900                         | 1371                                          | 2011         | 468                            | 285 (61)                                 | 183                                     | 0               |
| Armenia                  | 9 500                          | 362                                           | 2010         | 267                            | 234 (88)                                 | 33                                      | 129             |
| Bahrain                  | 49 000                         | 2273                                          | 2015         | 550                            | 271 (49)                                 | 279                                     | −106            |
| Bangladesh               | 18 600                         | 1014                                          | 2011         | 625                            | 266 (43)                                 | 359                                     | −159            |
| Barbados                 | 18 900                         | 1031                                          | 2012         | 371                            | 192 (52)                                 | 179                                     | −53             |
| Belarus                  | 8 300                          | 489                                           | 2008         | 370                            | 253 (68)                                 | 117                                     | 78              |
| Bhutan                   | 9 000                          | 281                                           | 2016         | 291                            | 202 (69)                                 | 89                                      | 89              |
| Bolivia                  | 7 600                          | 427                                           | 2011         | 352                            | 248 (70)                                 | 104                                     | 92              |
| (Plurinational State of) |                                |                                               |              |                                |                                          |                                        |                 |
| Bosnia and Herzegovina   | 12 800                         | 957                                           | 2009         | 181                            | 107 (59)                                 | 74                                      | 29              |
| Botswana                 | 17 000                         | 871                                           | 2012         | 340                            | 233 (69)                                 | 107                                     | 108             |
| Brazil                   | 15 600                         | 1318                                          | 2014         | 405                            | 235 (58)                                 | 170                                     | −49             |
| Bulgaria                 | 21 800                         | 1399                                          | 2011         | 361                            | 114 (32)                                 | 247                                     | −171            |
| Burkina Faso             | 1 900                          | 82                                            | 2014         | 274                            | 217 (79)                                 | 57                                      | 124             |
| Burundi                  | 700                            | 58                                            | 2012         | 293                            | 204 (70)                                 | 89                                      | 97              |
| Cabo Verde               | 7 000                          | 310                                           | 2009         | 564                            | 295 (52)                                 | 269                                     | −78             |
| Cambodia                 | 4 000                          | 183                                           | 2003         | 44                             | 35 (80)                                  | 9                                       | 30              |
| Cameroon                 | 3 700                          | 122                                           | 2010         | 351                            | 247 (70)                                 | 104                                     | 83              |
| Central African Republic | 700                            | 25                                            | 2009         | 295                            | 215 (73)                                 | 80                                      | 109             |
| Chad                     | 2 300                          | 79                                            | 2007         | 240                            | 186 (78)                                 | 53                                      | 128             |
| Chile                    | 24 600                         | 1749                                          | 2005         | 349                            | 225 (64)                                 | 124                                     | 67              |
| China                    | 16 700                         | 731                                           | 2012         | 289                            | 178 (62)                                 | 112                                     | 43              |
| Colombia                 | 14 400                         | 962                                           | 2011         | 370                            | 248 (86)                                 | 122                                     | 48              |
| Congo                    | 6 800                          | 323                                           | 2013         | 300                            | 221 (74)                                 | 79                                      | 108             |
| Cook Islands             | 16 700                         | 486                                           | 2007         | 240                            | 167 (70)                                 | 73                                      | 110             |
| Costa Rica               | 16 900                         | 1389                                          | 2014         | 388                            | 225 (58)                                 | 163                                     | 4               |
| Côte d’Ivoire            | 3 900                          | 187                                           | 2014         | 502                            | 266 (53)                                 | 236                                     | −70             |
| Croatia                  | 24 700                         | 1652                                          | 2010         | 599                            | 286 (48)                                 | 313                                     | −151            |
| Cuba                     | 12 300                         | 2475                                          | 2012         | 506                            | 282 (56)                                 | 225                                     | −42             |
| Czechia                  | 35 500                         | 2146                                          | 2012         | 802                            | 264 (53)                                 | 538                                     | −398            |
| Democratic People's Republic of Korea |          |                                                |              |                                |                                          |                                        |                 |
| Democratic Republic of the Congo | 800 | 32 | 2010 | 313 | 230 (74) | 83 | 103 |
| Djibouti                 | 3 600                          | 338                                           | 2007         | 199                            | 150 (75)                                 | 49                                      | 105             |
| Dominica                 | 11 000                         | 587                                           | 2007         | 284                            | 202 (71)                                 | 82                                      | 136             |
| Dominican Republic       | 17 000                         | 580                                           | 2015         | 355                            | 297 (84)                                 | 58                                      | 105             |
| Ecuador                  | 11 500                         | 1040                                          | 2013         | 369                            | 270 (73)                                 | 99                                      | 35              |
| Egypt                    | 12 700                         | 594                                           | 2012         | 323                            | 263 (81)                                 | 60                                      | 97              |
| El Salvador               | 8 000                          | 565                                           | 2009         | 360                            | 253 (70)                                 | 107                                     | 82              |
| Eritrea                  | 1 600                          | 51                                            | 2010         | 335                            | 248 (74)                                 | 87                                      | 107             |
| Country | GDP per capita in 2017, Intl $ | Health expenditure per capita in 2014, Intl $ | Year of list | Total no. of medicines on list | Similarity with WHO Model List, no. (%) | Dissimilarity with WHO Model List, no. | Similarity score |
|---------|-------------------------------|---------------------------------------------|--------------|-------------------------------|----------------------------------------|----------------------------------------|-----------------|
| Estonia | 31 700                        | 1668                                        | 2012         | 405                           | 156 (39)                               | 249                                    | -141            |
| Ethiopia | 2 200                        | 73                                           | 2014         | 707                           | 319 (45)                               | 388                                    | -209            |
| Fiji    | 9 800                        | 364                                          | 2015         | 296                           | 215 (73)                               | 81                                     | 114             |
| Gambia  | 2 600                        | 118                                          | 2001         | 164                           | 126 (77)                               | 38                                     | 92              |
| Georgia | 10 700                       | 628                                          | 2007         | 247                           | 206 (83)                               | 41                                     | 139             |
| Ghana   | 4 700                        | 145                                          | 2010         | 302                           | 219 (73)                               | 83                                     | 104             |
| Grenada | 15 100                       | 728                                          | 2007         | 282                           | 197 (70)                               | 85                                     | 130             |
| Guinea  | 2 200                        | 68                                           | 2012         | 238                           | 194 (82)                               | 44                                     | 116             |
| Guyana  | 8 100                        | 379                                          | 2010         | 280                           | 216 (77)                               | 64                                     | 116             |
| Haiti   | 1 800                        | 131                                          | 2012         | 197                           | 182 (92)                               | 15                                     | 153             |
| Honduras | 5 600                       | 400                                          | 2009         | 365                           | 227 (62)                               | 138                                    | 25              |
| India   | 7 200                        | 267                                          | 2015         | 367                           | 239 (65)                               | 128                                    | 45              |
| Indonesia | 12 400                     | 299                                          | 2011         | 275                           | 222 (81)                               | 53                                     | 127             |
| Iran (Islamic Republic of) | 20 100                     | 1082                                         | 2014         | 886                           | 342 (39)                               | 544                                    | -390            |
| Iraq    | 16 700                       | 667                                          | 2010         | 573                           | 260 (45)                               | 313                                    | -143            |
| Jamaica | 9 200                        | 476                                          | 2012         | 457                           | 265 (58)                               | 192                                    | 7               |
| Jordan  | 9 200                        | 798                                          | 2011         | 590                           | 287 (49)                               | 303                                    | -138            |
| Kenya   | 3 500                        | 169                                          | 2016         | 416                           | 310 (75)                               | 106                                    | 30              |
| Kiribati | 2 000                       | 184                                          | 2009         | 216                           | 173 (80)                               | 43                                     | 144             |
| Kyrgyzstan | 3 700                     | 215                                          | 2009         | 316                           | 206 (65)                               | 110                                    | 56              |
| Latvia  | 27 700                       | 940                                          | 2012         | 304                           | 127 (42)                               | 177                                    | -96             |
| Lebanon | 19 600                       | 987                                          | 2014         | 284                           | 232 (82)                               | 52                                     | 108             |
| Lesotho | 3 300                        | 276                                          | 2005         | 195                           | 148 (76)                               | 47                                     | 107             |
| Liberia | 1 300                        | 98                                           | 2011         | 215                           | 182 (85)                               | 33                                     | 137             |
| Lithuania | 32 400                     | 1718                                         | 2012         | 339                           | 153 (45)                               | 186                                    | -77             |
| Madagascar | 1 600                      | 44                                           | 2008         | 250                           | 170 (68)                               | 80                                     | 100             |
| Malawi  | 1 200                        | 93                                           | 2015         | 322                           | 249 (77)                               | 73                                     | 116             |
| Malaysia | 29 100                      | 1040                                         | 2014         | 308                           | 220 (71)                               | 88                                     | 98              |
| Maldives | 19 200                      | 1996                                         | 2011         | 535                           | 243 (45)                               | 292                                    | -111            |
| Mali    | 2 200                        | 108                                          | 2012         | 285                           | 220 (77)                               | 65                                     | 127             |
| Malta   | 41 900                       | 3072                                         | 2008         | 607                           | 245 (40)                               | 362                                    | -201            |
| Marshall Islands | 3 600                    | 680                                          | 2007         | 214                           | 142 (66)                               | 72                                     | 80              |
| Mauritania | 4 500                       | 148                                          | 2008         | 215                           | 168 (78)                               | 47                                     | 123             |
| Mexico  | 19 900                       | 1122                                         | 2011         | 706                           | 294 (42)                               | 412                                    | -260            |
| Mongolia | 13 000                      | 565                                          | 2009         | 256                           | 216 (84)                               | 41                                     | 126             |
| Montenegro | 17 800                     | 888                                          | 2011         | 452                           | 262 (58)                               | 190                                    | -26             |
| Morocco | 8 600                        | 447                                          | 2012         | 344                           | 252 (73)                               | 92                                     | 78              |
| Mozambique | 1 300                      | 79                                           | 2016         | 259                           | 232 (90)                               | 27                                     | 133             |
| Myanmar | 6 300                        | 103                                          | 2010         | 315                           | 249 (79)                               | 67                                     | 137             |
| Namibia | 11 200                       | 869                                          | 2016         | 382                           | 262 (69)                               | 120                                    | 72              |
| Nauru   | 12 300                       | 512                                          | 2010         | 230                           | 177 (77)                               | 53                                     | 132             |
| Nepal   | 2 700                        | 137                                          | 2011         | 300                           | 242 (81)                               | 58                                     | 116             |
| Nicaragua | 5 900                       | 445                                          | 2011         | 271                           | 212 (78)                               | 59                                     | 125             |
| Nigeria | 5 900                        | 217                                          | 2010         | 305                           | 224 (73)                               | 81                                     | 101             |
| Niue    | 5 800                        | 887                                          | 2006         | 213                           | 141 (66)                               | 72                                     | 75              |
| North Macedonia | 14 900                    | 851                                          | 2008         | 390                           | 218 (56)                               | 172                                    | -30             |
| Oman    | 46 000                       | 1442                                         | 2009         | 576                           | 299 (52)                               | 277                                    | -94             |
| Pakistan | 5 400                       | 129                                          | 2016         | 373                           | 347 (93)                               | 26                                     | 79              |
| Palau   | 14 700                       | 1429                                         | 2006         | 268                           | 167 (62)                               | 101                                    | 70              |
| Papua New Guinea | 3 700                     | 109                                          | 2012         | 270                           | 223 (83)                               | 47                                     | 132             |
| Paraguay | 12 800                      | 873                                          | 2009         | 306                           | 224 (73)                               | 82                                     | 92              |
| Peru    | 13 500                       | 656                                          | 2012         | 424                           | 298 (70)                               | 126                                    | 40              |

(continues. . .)
| Country                     | GDP per capita in 2017, Intl $ | Health expenditure per capita in 2014, Intl $ | Year of list | Total no. of medicines on list | Similarity with WHO Model List, no. (%)<sup>a</sup> | Dissimilarity with WHO Model List, no.<sup>b</sup> | Similarity score |
|----------------------------|--------------------------------|---------------------------------------------|--------------|-------------------------------|-----------------------------------------------|-----------------------------------------------|------------------|
| Philippines                | 8 400                          | 329                                         | 2008         | 519                           | 291 (56)                                      | 228                                           | −45              |
| Poland                     | 29 600                         | 1570                                        | 2017         | 441                           | 177 (40)                                      | 264                                           | −179             |
| Portugal                   | 30 500                         | 2690                                        | 2011         | 905                           | 256 (28)                                      | 649                                           | −497             |
| Republic of Moldova        | 6 700                          | 514                                         | 2011         | 476                           | 329 (69)                                      | 147                                           | 4               |
| Romania                    | 24 600                         | 1079                                        | 2012         | 635                           | 231 (36)                                      | 404                                           | −283             |
| Russian Federation         | 27 900                         | 1836                                        | 2014         | 518                           | 260 (50)                                      | 258                                           | −118             |
| Rwanda                     | 2 100                          | 125                                         | 2010         | 284                           | 216 (76)                                      | 68                                            | 128              |
| Saint Kitts and Nevis      | 28 200                         | 1152                                        | 2007         | 290                           | 204 (70)                                      | 86                                            | 140              |
| Saint Lucia                | 14 400                         | 698                                         | 2007         | 290                           | 204 (70)                                      | 86                                            | 140              |
| Saint Vincent and the Grenadines | 11 500                      | 917                                         | 2010         | 267                           | 216 (81)                                      | 51                                            | 151              |
| Senegal                    | 3 500                          | 107                                         | 2013         | 333                           | 213 (64)                                      | 120                                           | 43               |
| Serbia                     | 15 100                         | 1312                                        | 2010         | 472                           | 237 (50)                                      | 235                                           | −72              |
| Seychelles                 | 29 300                         | 844                                         | 2010         | 294                           | 210 (71)                                      | 84                                            | 114              |
| Slovakia                   | 33 100                         | 2179                                        | 2012         | 983                           | 291 (30)                                      | 692                                           | −553             |
| Slovenia                   | 34 500                         | 2698                                        | 2017         | 787                           | 305 (39)                                      | 482                                           | −359             |
| Solomon Islands            | 2 200                          | 108                                         | 2017         | 257                           | 194 (75)                                      | 63                                            | 115              |
| Somalia                    | 1 064                          | 11                                          | 2006         | 82                            | 73 (89)                                       | 9                                             | 66               |
| South Africa               | 13 600                         | 1148                                        | 2014         | 192                           | 157 (82)                                      | 35                                            | 90               |
| Sri Lanka                  | 12 900                         | 369                                         | 2013         | 318                           | 230 (72)                                      | 88                                            | 62               |
| Sudan                      | 4 300                          | 282                                         | 2014         | 300                           | 175 (58)                                      | 125                                           | 34               |
| Suriname                   | 14 900                         | 979                                         | 2014         | 285                           | 220 (77)                                      | 65                                            | 113              |
| Sweden                     | 51 200                         | 5219                                        | 2016         | 289                           | 143 (49)                                      | 146                                           | −61              |
| Syrian Arab Republic       | 2 900                          | 376                                         | 2008         | 964                           | 312 (32)                                      | 652                                           | −490             |
| Tajikistan                 | 3 200                          | 185                                         | 2009         | 272                           | 227 (83)                                      | 45                                            | 132              |
| Thailand                   | 17 900                         | 600                                         | 2013         | 547                           | 303 (55)                                      | 244                                           | −67              |
| Timor-Leste                | 6 000                          | 102                                         | 2015         | 239                           | 203 (85)                                      | 36                                            | 147              |
| Togo                       | 1 700                          | 76                                          | 2012         | 295                           | 234 (79)                                      | 61                                            | 109              |
| Tonga                      | 5 900                          | 270                                         | 2007         | 229                           | 164 (72)                                      | 65                                            | 123              |
| Trinidad and Tobago        | 31 300                         | 1816                                        | 2010         | 493                           | 265 (54)                                      | 228                                           | −41              |
| Tunisia                    | 11 900                         | 785                                         | 2012         | 719                           | 265 (54)                                      | 454                                           | −283             |
| Tuvalu                     | 3 800                          | 585                                         | 2010         | 177                           | 150 (85)                                      | 27                                            | 139              |
| Uganda                     | 2 400                          | 133                                         | 2012         | 363                           | 247 (68)                                      | 116                                           | 71               |
| Ukraine                    | 8 800                          | 584                                         | 2009         | 278                           | 225 (81)                                      | 53                                            | 104              |
| United Republic of Tanzania | 3 200                         | 137                                         | 2013         | 357                           | 251 (70)                                      | 106                                           | 75               |
| Uruguay                    | 22 400                         | 1792                                        | 2011         | 518                           | 244 (47)                                      | 274                                           | −106             |
| Vanuatu                    | 2 700                          | 150                                         | 2006         | 177                           | 147 (83)                                      | 30                                            | 131              |
| Venezuela                  | 12 500                         | 923                                         | 2004         | 306                           | 215 (70)                                      | 91                                            | 84               |
| (Bolivarian Republic of)   |                                |                                             |              |                               |                                               |                                               |                  |
| Viet Nam                   | 6 900                          | 390                                         | 2008         | 743                           | 282 (38)                                      | 459                                           | −289             |
| Yemen                      | 2 500                          | 202                                         | 2009         | 247                           | 201 (81)                                      | 46                                            | 131              |
| Zambia                     | 4 000                          | 195                                         | 2013         | 286                           | 217 (76)                                      | 69                                            | 92               |
| Zimbabwe                   | 2 300                          | 115                                         | 2011         | 346                           | 248 (72)                                      | 98                                            | 98               |

GDP: gross domestic product; Intl $: international dollars; WHO: World Health Organization.

* Number of medicines on both WHO’s model list and the national list.

* Number of medicines not on WHO’s model list.

* Estimated GDP.

Note: WHO’s model list refers to WHO’s Model list of essential medicines.