

International Variations In Essential Medication Lists

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Abstract

Every nation in the world has established a National Medication Formulary to account for all the medications present in the country. Many countries follow the Essential Medication List provided by the World Health organization (WHO) when making their own National Medication Formulary. Our study looked at variations in the National Formularies when compared to the Essential Medication Lists. Different relationships such as missing and extra medications lists were formulated and the statistics analyzed. It was noted that on average most of the countries studied were lacking 47% of medications, and had 30% additional medications on their national formulary. Further studies need to be conducted as Essential Medications may be lacking, or harmful medications may be present in a country's formulary leading to severe health problems.

Medications play a vital role in the treatment of various medical conditions. Therefore, it is important to ensure that people receive treatment and remain in good health, thereby contributing towards community prosperity. The World Health Organization (WHO) is in charge of formulating the "Essential Medication List" consisting "of over 350 drugs which are updated every two years"¹. Hill *et al* (2012) conducted a study comparing priority medicines for maternal and child health to the national formularies of 89 countries² identifying which medications were lacking in each country's formulary, and the urgent need to amend their formularies so that lifesaving medications were readily available. Our study aims to look at variations in the National Essential Medications Lists in ten developing nations in Africa.

The W.H.O. Expert Committee for the Selection and Use of Essential Medicines analyzes and categorizes medication into different classes based on their safety and efficacy. During the first meeting of the Expert Committee in 1977, the essential medications were defined as those medications that "are of utmost importance, and are basic, indispensable and necessary for the health needs of the population"³ The purpose of the Model List was articulated by the Committee at its third meeting held in 1982 in the statement, "they should therefore be available at all times in adequate amounts and in the appropriate dosage forms."⁴ A combination of the definition and its implications has been used to describe the essential medicines concept at all subsequent meetings of the Committee."⁵

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The Essential Medication List acts as a template for a country when preparing its own national medication formulary. The list of medications is very extensive and covers many classes including HIV, Cancer, anti-hypertensive, anti-psychotics, anti-microbial, HRT, antidotes, antibiotics, and NRT. All of these medications play major roles in the treatment and prevention of serious medical conditions. Countries around the world have developed their own national medication formularies to meet their individual health concerns. A comparison between the WHO Essential Medication List and a country's national medication formulary would allow us to identify the differences and analyze the effects these differences may have, such as when important medications have been left out or harmful ones included in their formularies. We hope that this study will help form a database from which a country can identify which medications they are missing and which ones they have added of their own accord that are not used elsewhere.

Method

The most recent (April 2013) Essential Medication List from the WHO was used as a template when comparing to the formularies of different countries. Ten developing nations from Africa were chosen as a sample group; their formularies ranging from 150-250 medications were obtained mostly from the WHO National Medicines List/Formulary/Standard Treatment Guidelines.⁶ These countries included Egypt⁷, Eritrea⁸, Ethiopia⁹, Kenya¹⁰, Lesotho¹¹, Seychelles¹², Somalia¹³, Tanzania¹⁴, Togo¹⁵, and Uganda¹⁶. The print copy of the Essential Medication list in addition to the countries' formularies were all converted into electronic versions so that comparisons could be made electronically, and the data stored for future use. Each country's individual formulary was then compared with the template and two separate lists

entitled 'Missing Medications' and 'Extra Medications' respectively were then compiled for each country. The Missing Medication list contained all the medications that were present in the template but absent from the country's formulary list. The Extra medications list contained all the medications that were present in the country's formulary but absent from the Essential Medication List. The complete set of each country's Missing and Extra medications list was then consolidated and tabulated to allow for comparisons against each other, in order to reveal various relationships between them. A final list was then made containing the total number of countries lacking a specific medication or containing extra medications.

Result

It was found that most countries in the study had an average of 237 medications (**Table 1**) in their formulary as opposed to the 350 medications in the Essential Medication List. (**Chart 1**) Eritrea had the highest number of medications in the study with 354 and Somalia had the lowest with 85 medications.

When comparing the Essential medication list to the formularies of the countries (**Table 2**) it was found that on average there were 146 medications (**Chart 2**) that were missing at an average of 41.77% (**Chart 3**). On average, most countries only had 58.23% (**Chart 4**) of medications that met the Essential Medications List standards. Somalia had the highest number with 235 missing medications (67%), and Eritrea had the lowest number i.e 68 missing medications (19%). A total of 57 medications were found to be common to both the Essential Medication List, and all the countries' formularies (**Table 3**). It was also found that 13 medications were totally omitted in all the countries (**TABLE 4**).

It was found that on average 72 medications (**Table 5, Chart 5**) or 30.5% (**Table 5, Chart 7**) of the medications in a country's formulary were not found on the Essential Medication list. Thus, from the 237 medications in a country's formulary, 165 medications (**Table 6, Chart 6**) at an average of 70% (**Table 6, Chart 7**) were medications found in the Essential Medication List. It is important to remember that this value does not reflect the number of missing medications; it rather shows us the number of medications present in the country's formulary that are also part of the Essential Medication List. When comparing countries to each other, it was seen that Egypt was the country with the most number of extra medications (113), and Somalia was the country with the least number of extra medications (9).

It was also noted that from a total of 404 extra medications, 3 medications were universally included in all the countries

formularies even though they are not present in the Essential Medication List (**Table 6**).

Conclusions

From the study it was seen that on average most of the countries were lacking at least 47% of the WHO medications (149/311) and had at least 18 medications commonly found in their formularies that are not present in The Essential Medication List. About 30% of a country's formulary contained extra medications that were not found on the Essential Medication List. These could be medications that have been previously part of the Essential Medication List but have now been removed due to their adverse effects. These medications could also be present due to historical uses but lack current clinical evidence, thereby putting millions at risk of suffering adverse effects.

The results are staggering when extrapolated to the millions of people in a given country who would not have access to essential medications in the event that they should require them, primarily because these medications are not present in their country's formulary.

Discussion

The study has shown a great deal of disparity between the countries' formularies and the Essential Medication List. This study did not take into consideration the GDPs of the countries, or the budget allocation for medications. It also did not take into consideration the different disease states that are particularly prevalent in these countries. These disease states may be the primary reason why medications have been included, excluded, or added to a given country's formulary.

It is imperative that further studies are conducted to show the differences between other national formularies and The WHO Essential Medication List. Further examinations will allow us to set up a comprehensive database containing each country's formulary compared to the Essential Medication List, which should be a vital asset in providing better awareness regarding medications worldwide. Analysis of the data will also allow us to look at the medication profile for different countries and help understand why a country would omit or add a medication, and to address needs efficiently. It would also help neighboring countries to form purchasing alliances where they would be able to obtain the essential medications at better prices. Countries would be able to identify the areas in which there is a lack of medication and address the issues in a swift manner. Philanthropists and NGOs would also be able to target their resources in specific and more strategic areas so that the outcomes can be achieved in a constant and organized fashion. Most importantly, removal of a medication that is harmful or the

addition of an essential medication could potentially help ensure better health for millions of people. Access to the database would also give the general population a chance to hold the country accountable for their actions when it comes to the provision of medications in their country. Having an electronic database linked to every country's profile would help the country identify, keep track of, and understand the significance of addition to, and subtraction of, medications from future Essential Medication Lists. It is also important to note that, not all nations have provided their national formularies to the WHO, which would be a requirement for future studies to be successful.

References

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Table 1. Total and average number of medications in the countries

Country	Total medications
Egypt	265
Eritrea	354
Ethiopia	233
Kenya	231
Lesotho	195
Seychelles	265
Somalia	85
Tanzania	236
Togo	219
Uganda	287
Average #	237

Chart 1. Total number of medication in each country (blue), the average number in each country (red) and the total number of medications in the Essential Medication List (green)

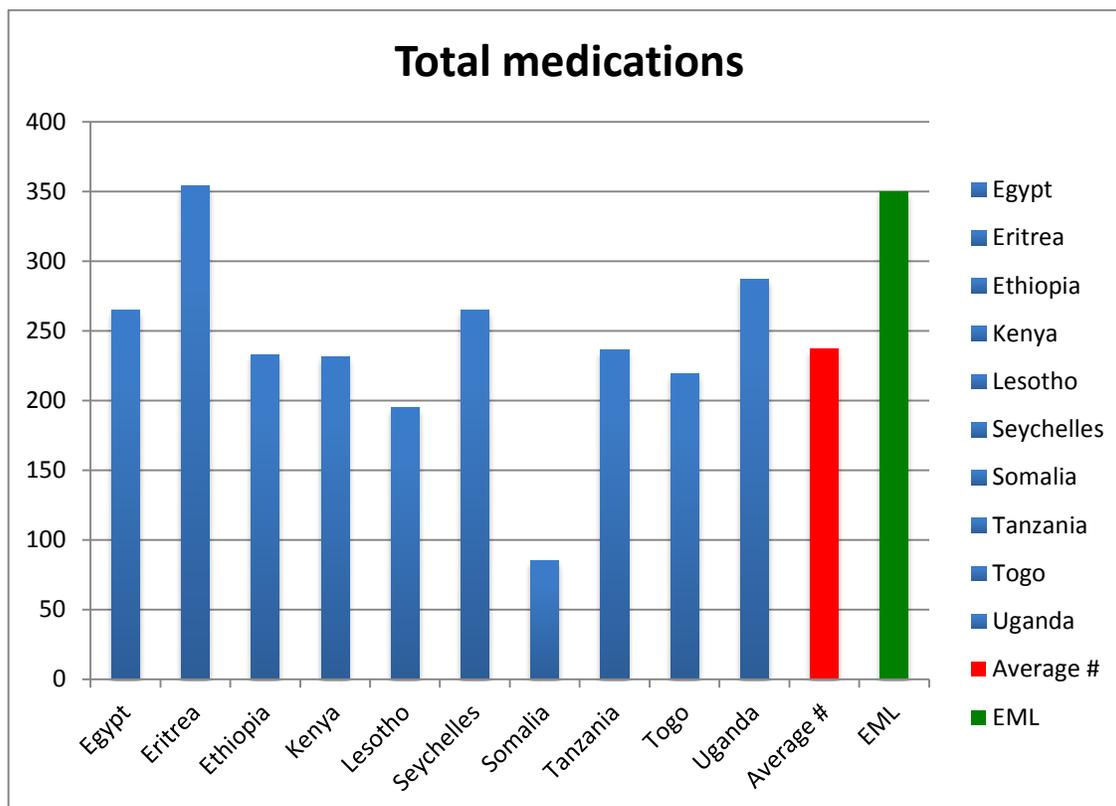


Table 2. Number of medications missing from each country and the average compared to the Essential Medication List.

Country	Number of missing medications
Egypt	159
Eritrea	68
Ethiopia	132
Kenya	105
Lesotho	166
Seychelles	150
Somalia	235
Tanzania	148
Togo	175
Uganda	124
Average #	146.2

Chart 2. Number of medications missing amongst countries compared to the Essential Medication List (Average in Red)

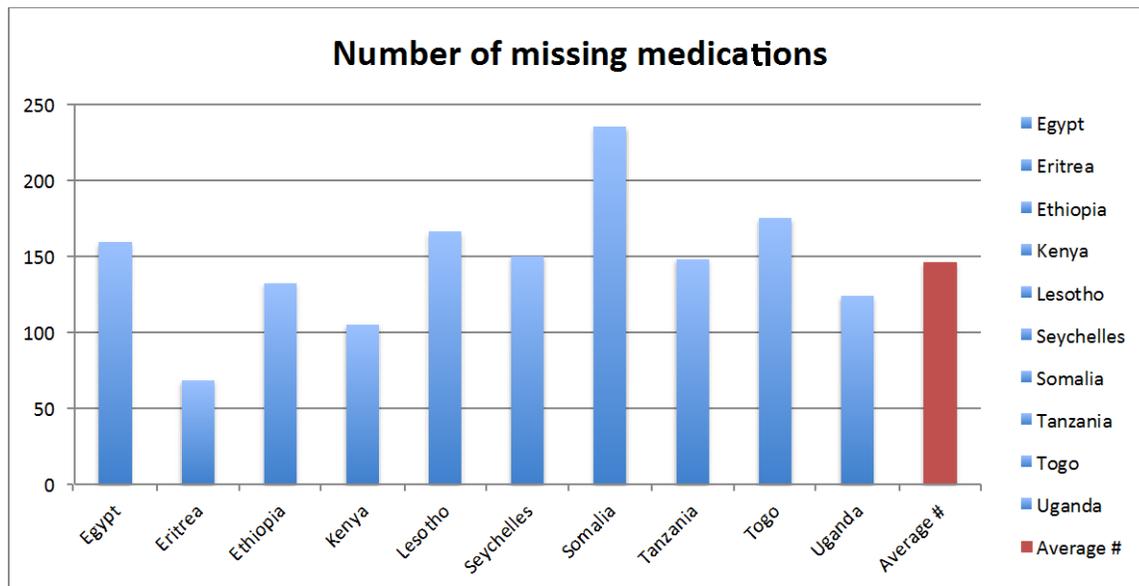


Chart 3. Missing medication (%) amongst countries compared to the Essential Medication List (Average in Blue)

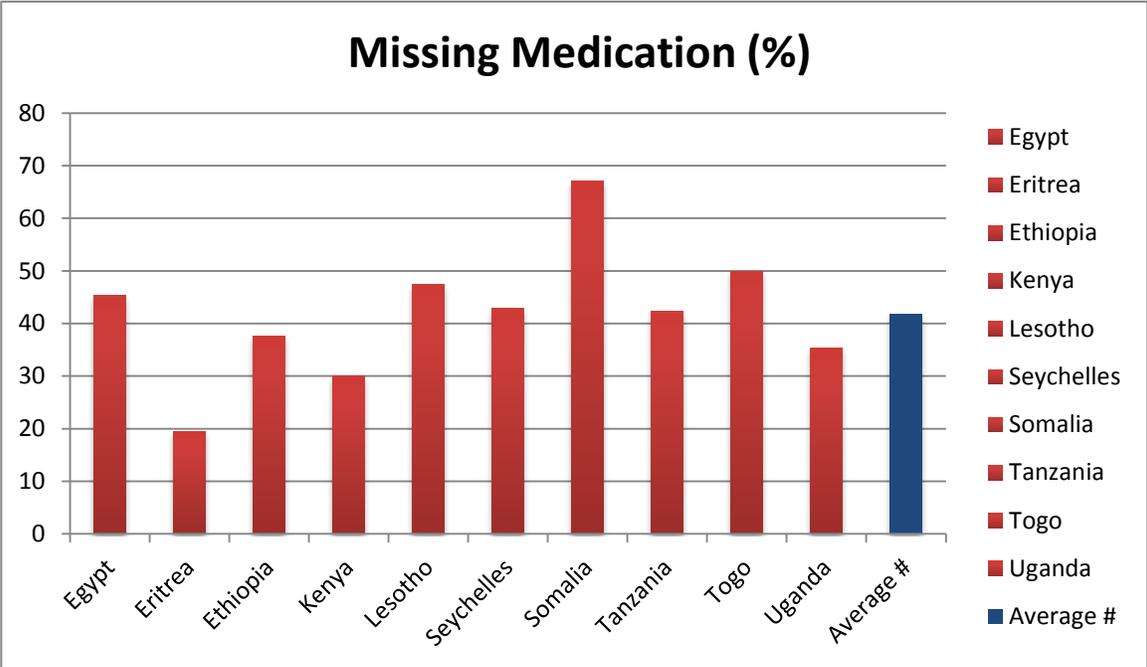


Chart 4. Pie chart showing average distribution (%) of missing medications compared to the Essential Medication List

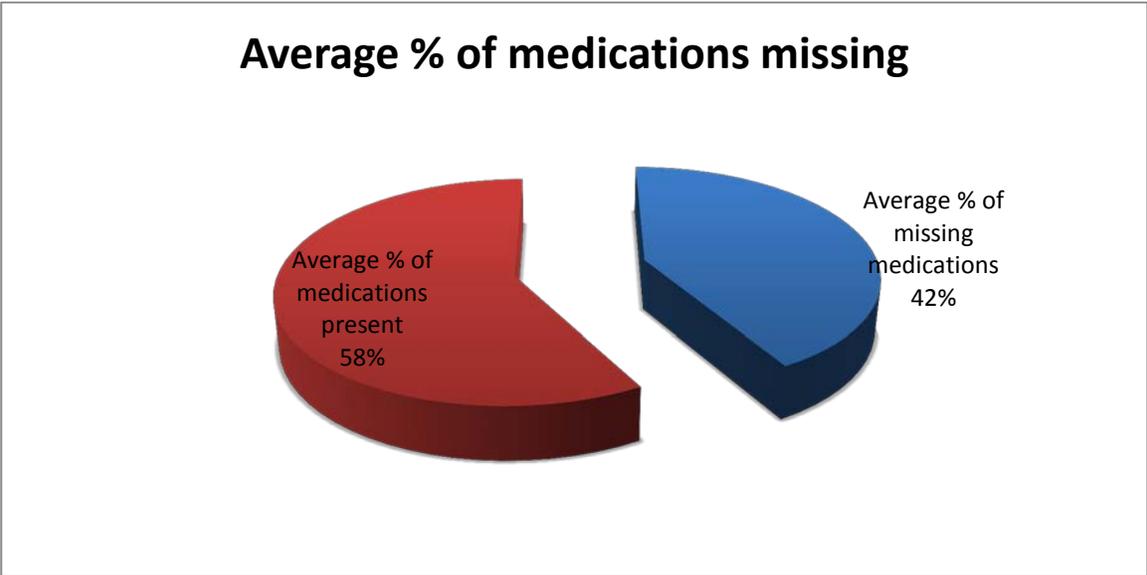


Table 3. List of medications that were present all countries when compared to the Essential Medication List

Medications following EML in all countries

Acetaminophen	Dapsone	Hepatitis B vaccine	Polyvidone Iodine
Acetylsalicylic acid	Dexamethasone	Hydrocortisone	Prednisolone
Amitriptylline	Dextrose	Ibuprofen	Pyrazinamide
Amoxicillin	Diazepam	isoniazid	Ranitidine
Amoxicillin + clauvalinic acid	Digoxin	Lidocaine	Rifampicin
Ascorbic acid	Doxycycline	Magnesium sulfate	Rifampicin + isoniazid
BCG vaccine	Epinephrine	Measles vaccine	Rifampicin + isoniazid + pyrazinamide
Benzathine benzylpenicillin	Ergometrine	Methyldopa	Salbutamol
Benzyl benzoate	Erythromycin	Metronidazole	Silver sulfadiazine
Benzylpenicillin	Folic acid	Nystatin	Sodium chloride
Chloramphenicol	Furosemide	Oral rehydration salts	Sodium lactate
chlorphenamine	Gentamycin	Oxytocin	Streptomycin
chlorpromazine	Glibenclamide	Phenobarbital	Tetanus vaccine
Clotrimazole	Griseofulvin	Polio vaccine	Tetracycline
			Thiamine

Table 4. List of medications that were omitted from all countries even though they are present in the Essential Medication List

Missing medications in all countries

- atazanavir
- bevacizumab
- bisoprolol
- capreomycin
- clozapine
- eflornithine
- estradiol cypionate + medroxyprogesterone acetate
- fomepizole
- imipenem + cilastatin
- levofloxacin
- miltefosine
- nicotine replacement therapy (NRT)
- paromomycin

Table 5. Table showing the total number of medications, and the number of medications not found in the Essential Medication List (extra medications), and the % of medications that are considered extra in each country.

Country	Total medications	Number of Extra medications	% Extra in each country
Egypt	265	113	42.64150943
Eritrea	354	111	31.3559322
Ethiopia	233	54	23.17596567
Kenya	231	25	10.82251082
Lesotho	195	50	25.64102564
Seychelles	265	104	39.24528302
Somalia	85	9	10.58823529
Tanzania	236	73	30.93220339
Togo	219	83	37.89954338
Uganda	287	100	34.84320557
Average #	237	72.2	30.46413502

Table 6. Table showing the total number of medications, and the number and % of medications found in the Essential Medication List

Country	Total medications	Following Essential Medication List	% following EML
Egypt	265	152	57.35849057
Eritrea	354	243	68.6440678
Ethiopia	233	179	76.82403433
Kenya	231	206	89.17748918
Lesotho	195	145	74.35897436
Seychelles	265	161	60.75471698
Somalia	85	76	89.41176471
Tanzania	236	163	69.06779661
Togo	219	136	62.10045662
Uganda	287	187	65.15679443
Average #	237	164.8	69.53586498

Chart 5. Number of medications not found in the Essential Medication list (Red) compared to the number of medications in a country (Blue)

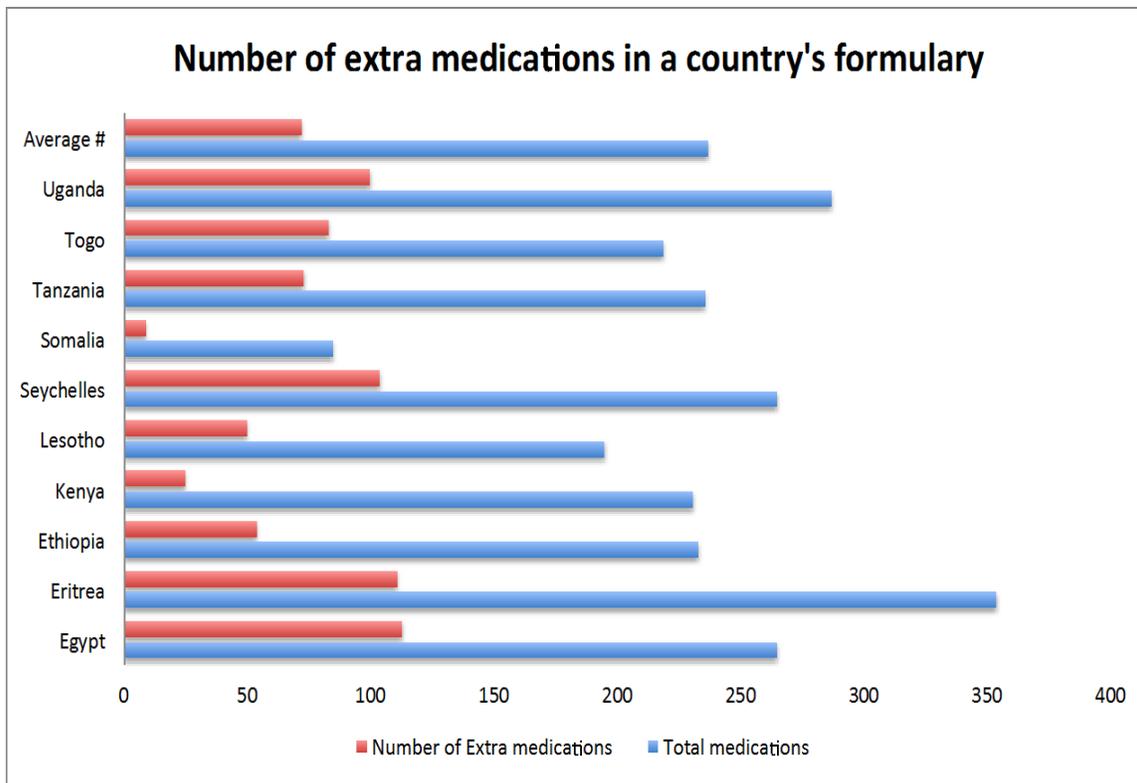


Chart 6. Number of medications found in the Essential Medication list (Red) compared to the number of medications in a country (Blue)

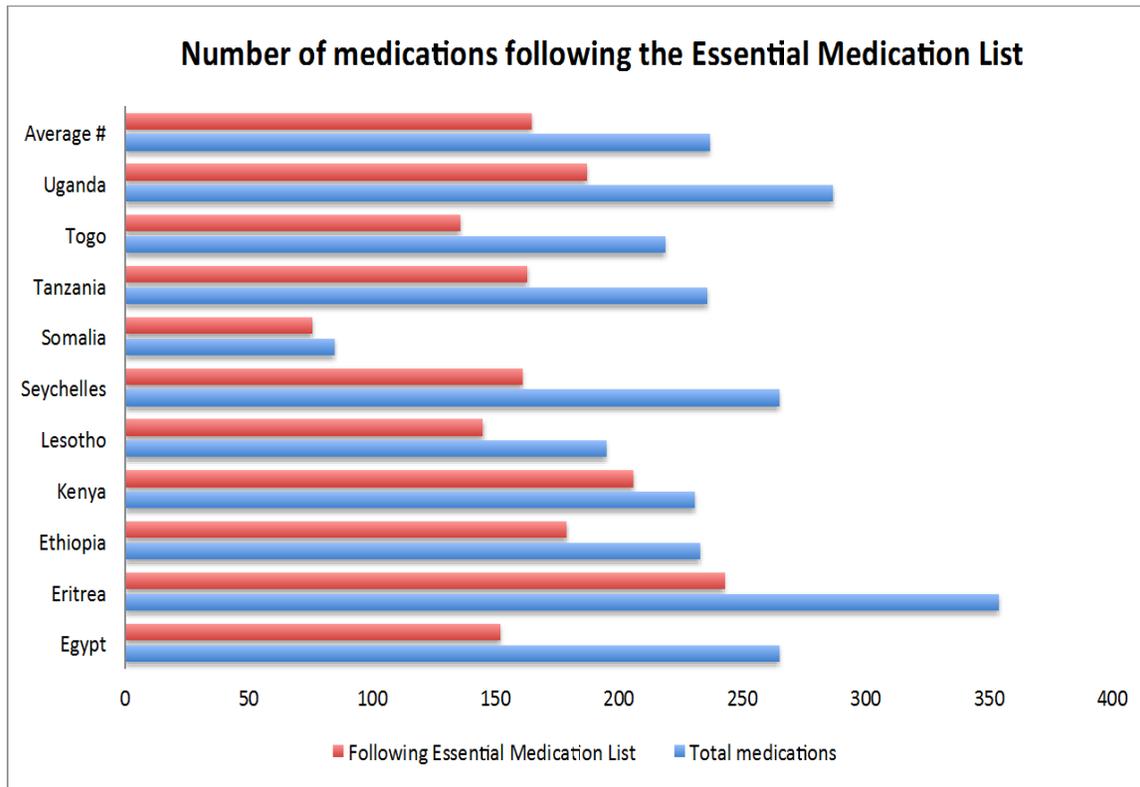


Chart 7. Showing 30% of medication of a country formulary is not part of the Essential medication list.

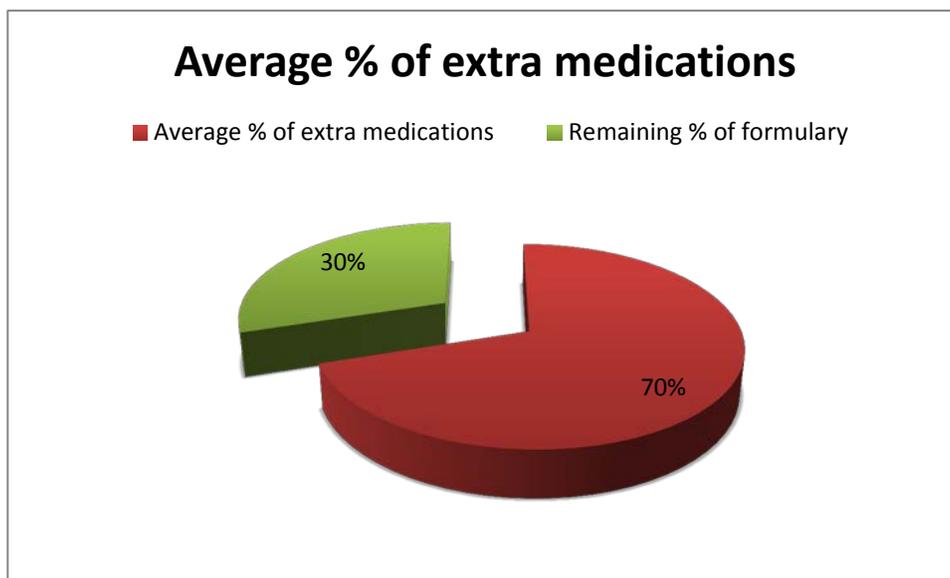


Table 6. List of medications that were present in all countries but not in the Essential Medication List.

Extra medications in all countries

- Aminophylline
- Atenolol
- Promethazine