



Workshop

## **Drug lifecycle control in Sub-Saharan Africa**

**From production to responsible safe disposal and elimination in  
wastewater treatment plants**

(Med4Africa)

# **The Costs Resulting From Pharmaceuticals Waste: The Case of Tikur Anbessa Specialized Hospital**

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## Background- Supply Chain Management

**Supply Chain Management-Every economic activity in the order fulfillment cycle from source to end including reverse supply chain.**

- Supply Chain Management involves the planning and management of all activities related to:
  - sourcing, procurement, manufacturing,
  - all logistics activities and,
  - customer services.
  - Reverse logistics

### **Enablers of Supply Chain Functions**

- These functions are enabled through the presence of :
  - Trade facilitation services: e.g. financing ;
  - Conducive regulatory environment e.g. customs;
  - Infrastructures like roads, railways, ports & terminals, & cool chain logistics facilities
  - Digitalization(tracking and tracing)

## Pharmaceutical Supply Chain Management

- Supply Chain Management in the pharmaceutical industry follows the same **horizontal and vertical structure of pharmaceutical value chain governance.**

### Key stakeholders

- The key stakeholders in this Pharmaceutical supply chain include:
  - Multiple government agencies(e.g. Quality Control Authorities),
  - Hospitals, Clinics,
  - suppliers,
  - drug manufacturers,
  - importers, drug distributors,
  - pharmacy chains, retailers,
  - research organizations, and
  - Customers

E.g. Based on Annual report of Ethiopian pharmaceutical Supply Agency (2021), its performance is affected by a number of supply chain actors.  
(both internal & external)

Description	Indicator
Budget	17,011,435,811.59ETB(340,228,716 .2318 USD)
Forecasting Accuracy	53%
Procurement lead time(entire cycle)	240.83 Days
Procurement lead time after LC to port of destination	57.3 Days
Lead time from port of destination to EPSA warehouse	18.5 Days
Availability(Customer Service Level)	91%
Market share	73%
Forex Availability	68%

## Sustainable Public Procurement/Green Public Procurement for Pharmaceuticals

- Sustainable Public Procurement (SPP) is a process whereby organizations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis for the benefit of society and the economy (Indiana University, 2018), while minimizing damage to the environment.
- SPP has three pillars, viz.:
  - economic development;
  - social development; and
  - environmental protection

**Pharmaceutical procurement** process should take into the account the entire lifecycle of the product or service.

**Life-Cycle Costing Approach:** the life-cycle costing is used to measure and compare costs including those attributed to environmental externalities:

- Investment,
- operation,
- maintenance and,
- **disposal costs**

## Pharmaceutical Waste –Empirical Review

- A study made by Iosue(2020) on pharmaceutical waste disposal systems of Ethiopia, Kenya, Sudan and Uganda in relation to the WHO guidelines for pharmaceutical waste disposal.
- The study identified gaps in policy and practice of pharmaceutical waste disposal in each case study country.

On Ethiopia:

Guidelines from the Food, Medicine and Health Care Administration and Control Authority of Ethiopia (2011) stipulate procedures for protecting public health and the environment from hazardous pharmaceutical waste.

- The guidelines state that “medicine that is unfit for use shall not be stored for more than six months” and that any disposal practice requires the attendance of an inspector.
- Certificates are issued following the disposal activity.
- Disposal sites must meet Environment Impact Assessment standards.

## Household Level

A review by Iosue(2020) revealed that:

- Over half of households surveyed had unused medicines at home.(Ayele and Mamu, 2018; Kahsay et al., 2020; Kassahun and Tesfaye, 2020)
- Disposing of unused medicines by throwing them in the trash was the most common method of household disposal. (Atinafu et al., 2014; Ayele and Mamu, 2018; Kahsay et al., 2020.)
- Disposing of medicines by flushing them down the toilet was another common method(Gelayee and Binega, 2017; Kassahun and Tesafye, 2020; Yimenu et al., 2020.)
- Burning unused medicines was the second or third most common disposal method. (Atinafu et al., 2014; Gelayee and Binega, 2017)



## **Costs Resulting from Pharmaceutical Waste**

- **Overtime, countries' expenditure on and cost of medicines has been growing**
- **Modern health care is unthinkable without the availability of necessary medicines and health technology products.**
- **Weak supply and distribution systems, insufficient health facilities and staff, and low investment in health, and high cost are some of the reasons for wastage**
- **Presence of wasted medicines at different level of the supply chain including patient's homes, may lead to several problems**
- **wastage medicines may pose social impact particularly to the poor, leading to a high number of people to be under treated by making medicines less accessible.**

## Objective

- **To estimate the direct costs resulting from pharmaceuticals waste in public hospital in Ethiopia with reference to Tikur Anbessa Specialized Referral Hospital as A case study.**

## **Tikur Anbessa Specialized Hospital- Case**

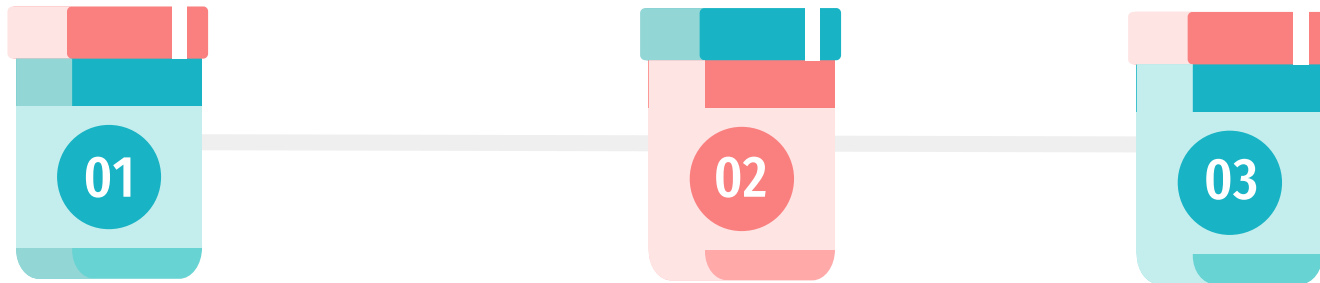
- Established in 1972, Tikur Anbessa Specialized Referral Hospital is teaching public hospital under College of Health Sciences of Addis Ababa University.
- The hospital was centrally administered by the Ministry of Health (MoH) and later transferred to AAU in 1998. With over 700 beds, TASH serves as a training center for undergraduate and postgraduate medical students, dentists, nurses, midwives, pharmacists, medical laboratory technologists, radiology technologists, and others.
- It has 1102 Health workers and over 2000 administrative staffs.
- Its annual budget is 900 million Ethiopian Birr(18,000,000USD), which is about 40% of the total university budget.
- Of this budget, annual pharmaceutical budget is 160,000,000 Birr(3,200,000 USD) and directly procured from Ethiopian Pharmaceutical Supply Agency.

# Methods

Quantitative approach using cross-sectional survey design was used to estimate the cost

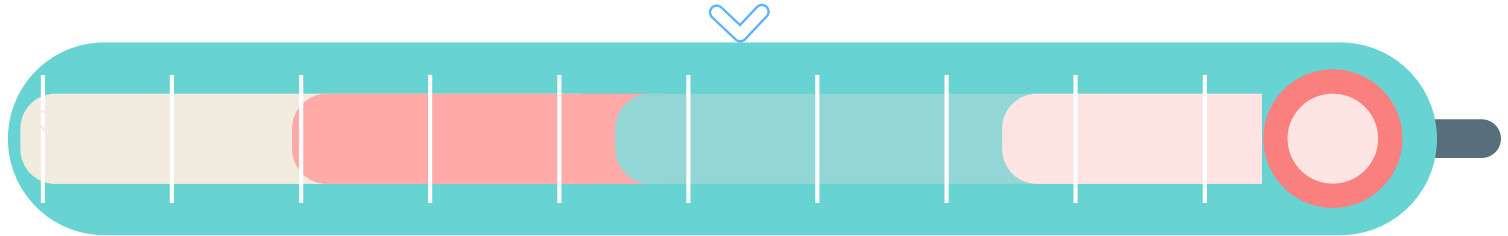
The value of medicines purchased and expired in 2021/22 fiscal year for TASH were accessed using the data abstraction forms.

Descriptive statistics were used.

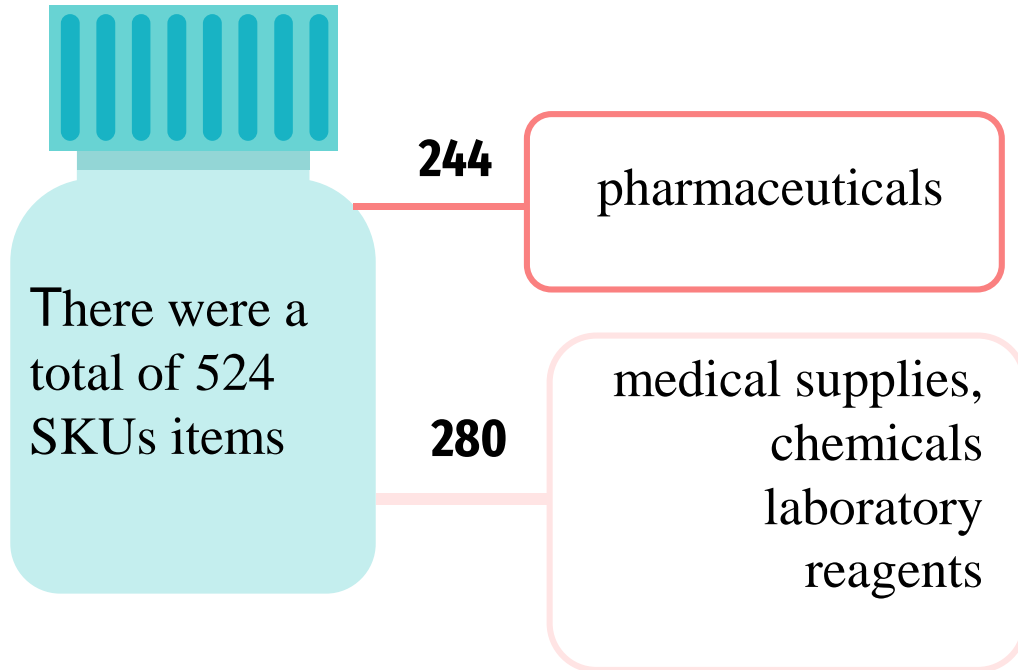


# Analysis of the Data

Using Microsoft Excel. Means, and percentages were computed. Data qualities were checked for clarity, completeness, and appropriateness. Permission to collect data was also secured from the hospital.

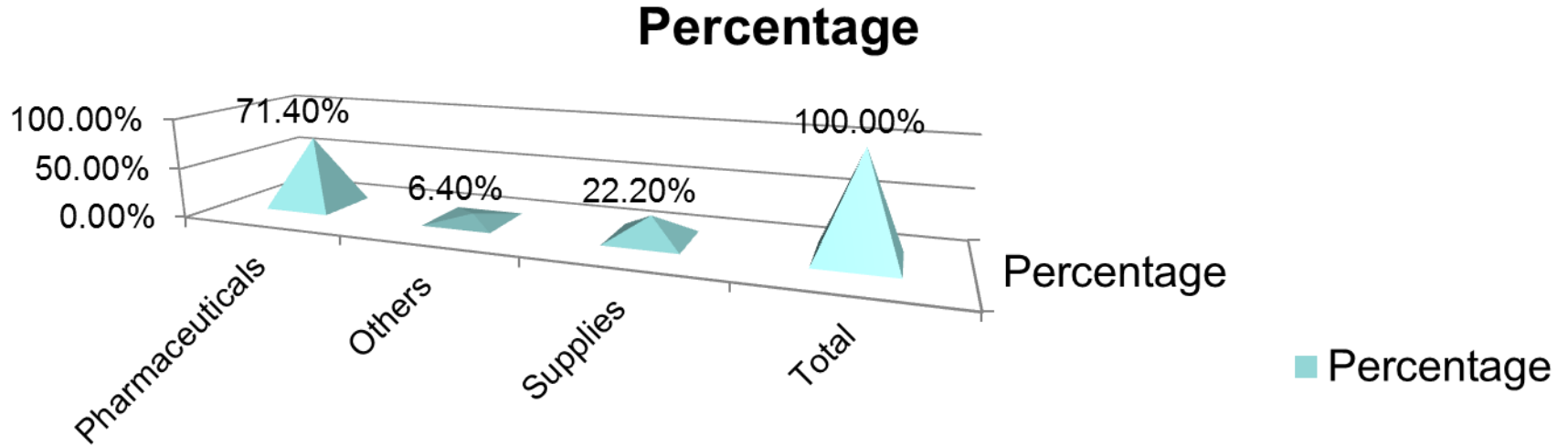


# Extent of Medicines in 2021/22



The financial value of these commodities is worth of ETB160,087,976.3 (USD 3,078,614.9). Of these, pharmaceuticals accounts for 71.3% of the total value.

**Table 1: Value of items purchased by Tikur Anbessa Specialized Hospital pharmacy in 2021/22 fiscal year**



	Pharmaceuticals	Others	Supplies	Total
Percentage	71.40%	6.40%	22.20%	100.00%

In the same year, health commodities worth of ETB 3,844,050.62 (~73924.05) wasted at stores mainly due to expiry, which accounts for **2.4% of the total value**.

Most of these expired products were pharmaceuticals (90.86%), Medical equipment and Lab reagents (6.65%) and medical supplies (2.48%)

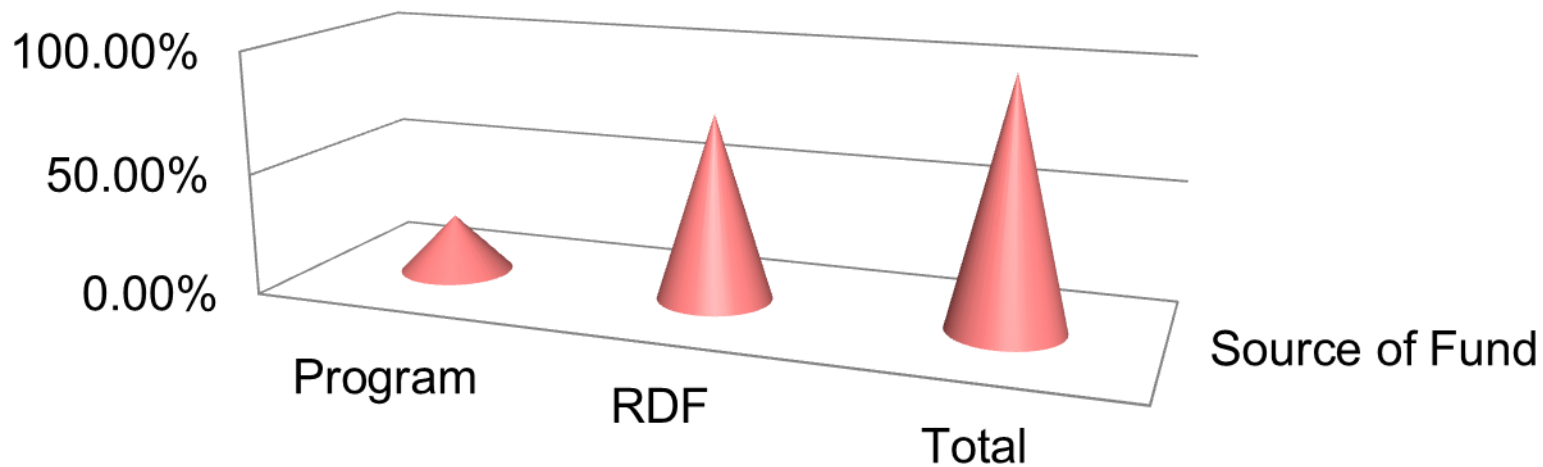


**Table 2: value of wasted items in Tikur Anbessa Specialized Hospital pharmacy in 2021/22 fiscal year**

Category	Value (ETB)	%
Medical equipment and Lab reagents	255,733.32	6.65%
Medical Supplies	95,520.39	2.48%
Pharmaceuticals	3,492,796.91	90.86%
<b>Total Disposable Medicine.xls</b>	<b>3,844,050.62</b>	<b>100%</b>

When the wastage is further analyzed by source, commodities purchased through revolving drug fund (RDF) i.e., from government accounts for **76.2%**. The cost for the other products (program medicines) which is covered by developmental partners to be supplied to patients freely were relatively less.

**Table 3: value of wasted items in Tikur Anbessa Specialized Hospital pharmacy in 2021/22 fiscal year**



	Program	RDF	Total
■ Source of Fund	23.80%	76.20%	100.00%

**Table 4: Top ten products expired medicines in Tikur Anbessa Specialized Hospital pharmacy in 2021/22 fiscal year**

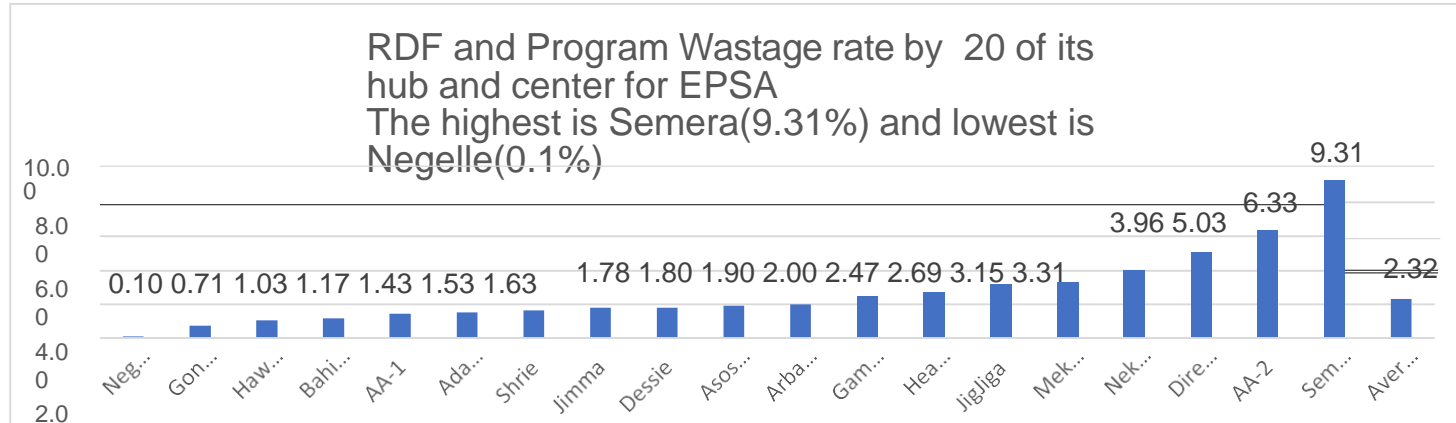
Items	Cost percent	
Bendamustine HCL 100mg in vial powder for injection (Lyophilized)	796071	21%
COVID-19 Vaccine	597787.8	16%
Thiopental Sodium - 0.5g in vial - Powder for Injection	520680.5	14%
Diazepam - 5mg/ml in 2ml Ampoule - Injection	488489.9	13%
Paclitaxel -100mg/16.7ml - Solution for Injection	315527.1	8%
Insulin Isophane Human - 100 IU/ml in 10ml - Injection (Suspension)	165462.5	4%
Covid-19 Rapid test device	159297	4%
Ampicillin Sodium- 500mg in Vial- Powder for Injection	150905.4	4%
Thalidomide - 50mg - Capsule	115701.3	3%
Etoposide - 100mg/5ml in 5ml Ampoule - Injection	103472	3% 19

Close to **90% of expired products (by value) were generated from 10 item.**

**Anti-cancer drugs** such as Bendamustine HCL 100mg in vial powder for injection and Paclitaxel -100mg/16.7ml - Solution for Injection make up 21% of the total wastage.

COVID-19 Vaccines and **insulin** were also the other vital drugs found being expired(8%).

As a comparison with EPSA: From the annual procurement of 17, 011, 435,811.59ETB, (which is equivalent to **340,228,716.2318USD**); **2.32%** is pharmaceutical waste, which is , equivalent to 394,665,311ETB( **7,983,306. USD**)



# Discussion

- Medicines wastage might be unavoidable; however, it should be kept low.
- In this study, 2.4% of the commodities (by value) were wasted while in stores before being issued to dispensaries.
- The real magnitude and cost of wastage of health commodities including pharmaceuticals in this hospital would have been higher if it accounted the wastage at dispensaries, ward and patient's homes.
- In this study, other costs that are associated with the acquisition of medicines, disposal and shortage are unaccounted.
- The medicines wastage reported in this study enlighten the extent of the problem.
- However, this report could be underestimated since wastages at the dispensaries, medical wards, and other areas of the hospitals and household levels were not included.

## Cont...

A study conducted at the in-patient health services of four hospitals in the Awi zone of Amhara Regional State recorded **wastage rates ranging from 1.53% and 11.2%**.

The study also added that **program medications and antibiotics were the most frequently wasted** medications at all the studied hospitals (Ebrahim *et al.*, 2019).

**Medicine wastage is not limited to institutional settings but also at the household level.**

A recent report from public health centers in Dessie town indicated that **85.17% of patients had unused medications at their home** during the study period (Kassahun and Tesfaye, 2020).



Similar study conducted by Dawit et al(2019) on factors contributing to medicines wastage in public health facilities of South West Shoa Zone, Oromia Regional State, revealed that **supplier-related factors** such as:

- supplying **near expiry products and applying push system** in some cases and ,

internal factors such as :

- weak inventory management,
- lack of sufficient human resources for pharmaceutical services,
- lack of medicines' transfer policy,
- shortage of storage spaces and poor communications across various units in other cases, were identified to be significant drivers of wastages in Ethiopian Hospital.

## Cont...

Previous studies both in Ethiopia and elsewhere documented that **poor coordination and communication among stakeholders** appear to be responsible for some expiry incidents in health facilities (Nakyanzi, 2010; Gebremariam *et al.*, 2019).

A study conducted in Uganda also reported a **push system as a reason for increasing the volume of expiry** compared to the pull system (Tumwine *et al.*, 2010).

## Cont...

Different countries have implemented various strategies to reduce medicine waste.

For instance, applying a simple 'rule of thumb' for the inventory procedures, ensuring transparency of inventory, strictly following **FIFO policy**, fostered internal collaboration, and sharing information within the hospital have led a considerable potential in reducing wastages (Yates *et al.*, 2017).

# Conclusion

- **Costs resulting from pharmaceutical waste** in the case study, TASH and EPSA (the largest supplier) is **significant given limited budget allocated to public hospitals**.
- Among the pharmaceutical wastes, **significant portion are the vital drugs** needed for patients in the hospital due to non availability in other health facilities. (e.g. TASH is the only cancer treatment center in Ethiopia until recently).
- **Indirect costs** (costs of disposal, environmental cost, opportunity cost, non availability of experts and regulatory limitations on how to dispose pharmaceutical costs) are **unaccounted implicit costs** which become a growing public health, environmental and financial concern.

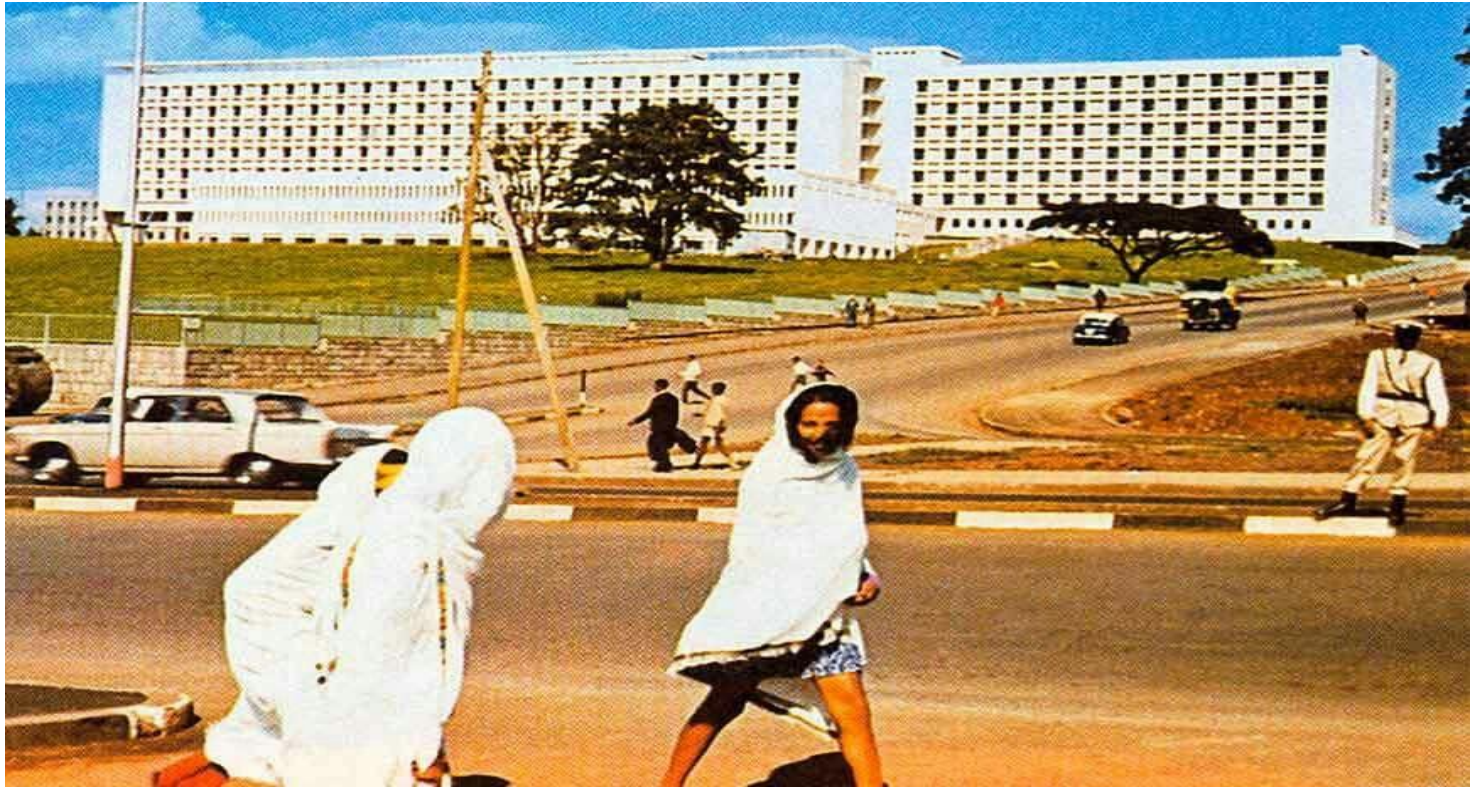
# Recommendation

- **More evidence need to be generated** and appropriate design should be in place to minimize the direct and indirect medical and non medical cost of pharmaceuticals and other health commodities wastage.
- **Digitalization of Pharmaceutical logistics** for tracking and tracing pharmaceutical to minimize costs related to pharmaceutical wastes.
- **Institute pharmaceutical value chain governance** that includes reverse pharmaceutical supply chain to improve supply chain efficiency.

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# Tikur Anbessa hospital in 1978



Special Thanks to:  
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