

Drug Security in Nigeria

Technology for Supply Chain Integrity

November 2017

Caveat

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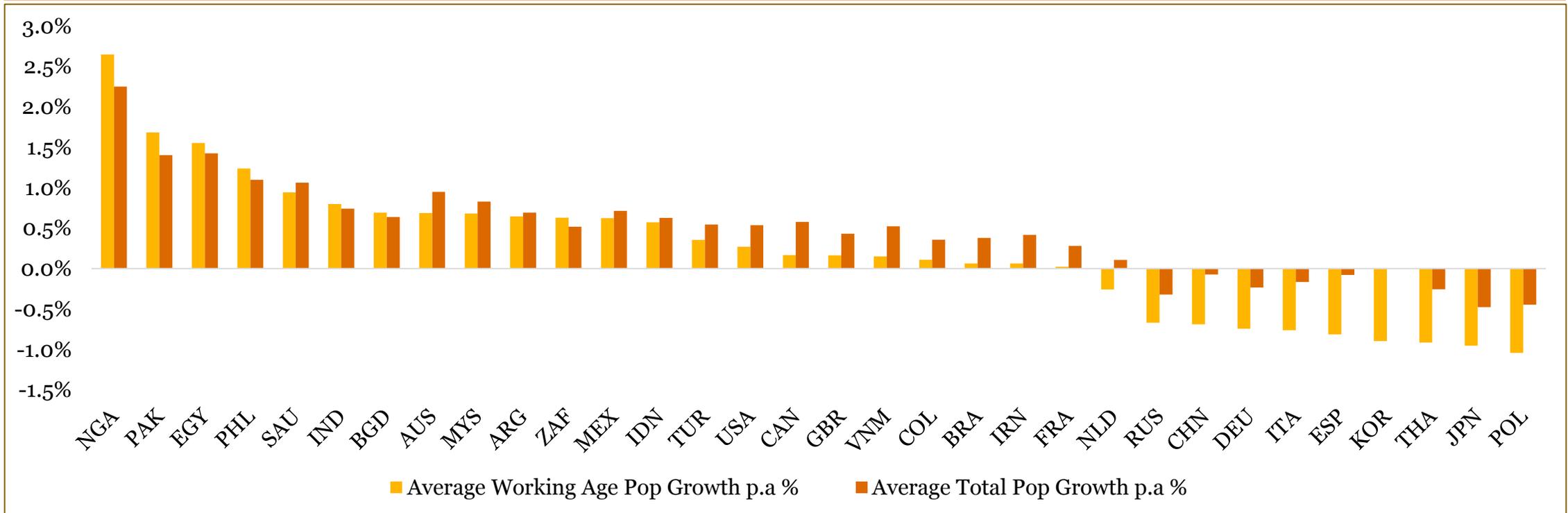
4 What else can be done

State of the Nigerian Economy

2016: Average total population growth vs. average working age population growth (2016 - 2050)

Nigeria, Egypt, Pakistan and the Philippines are projected to have the highest average annual population and working age population growth rates

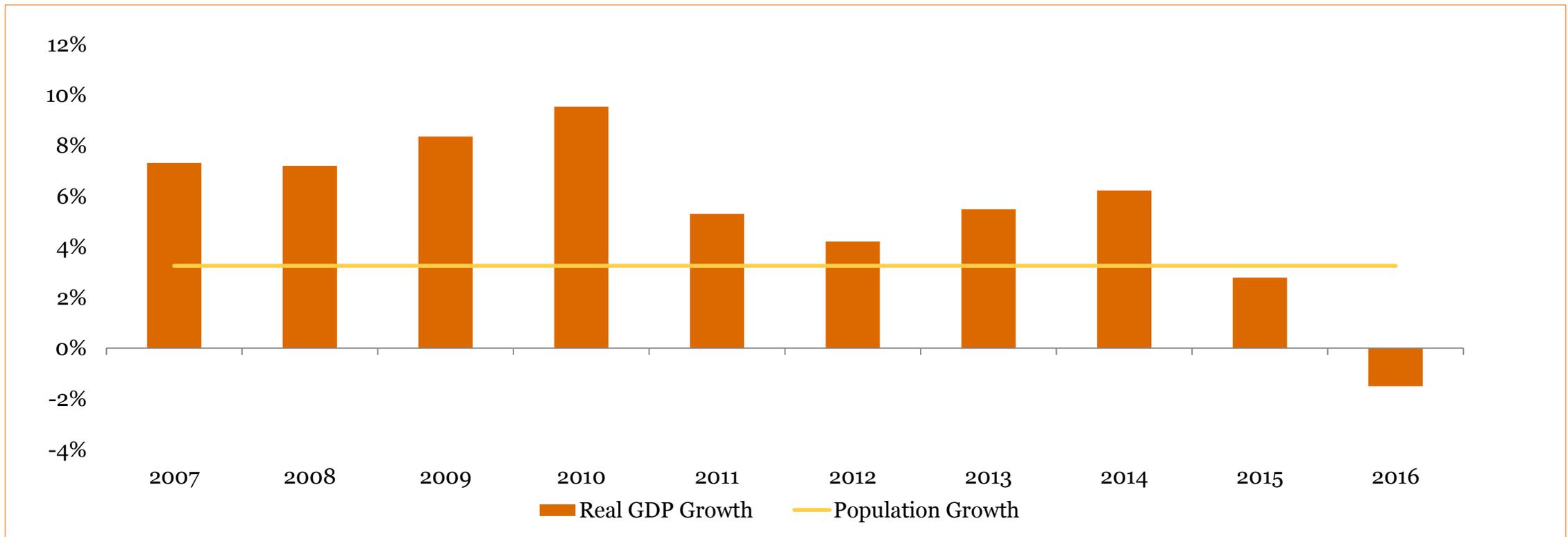
Average total population growth vs. average working age population growth (2016 - 2050)



Source: PwC Analysis

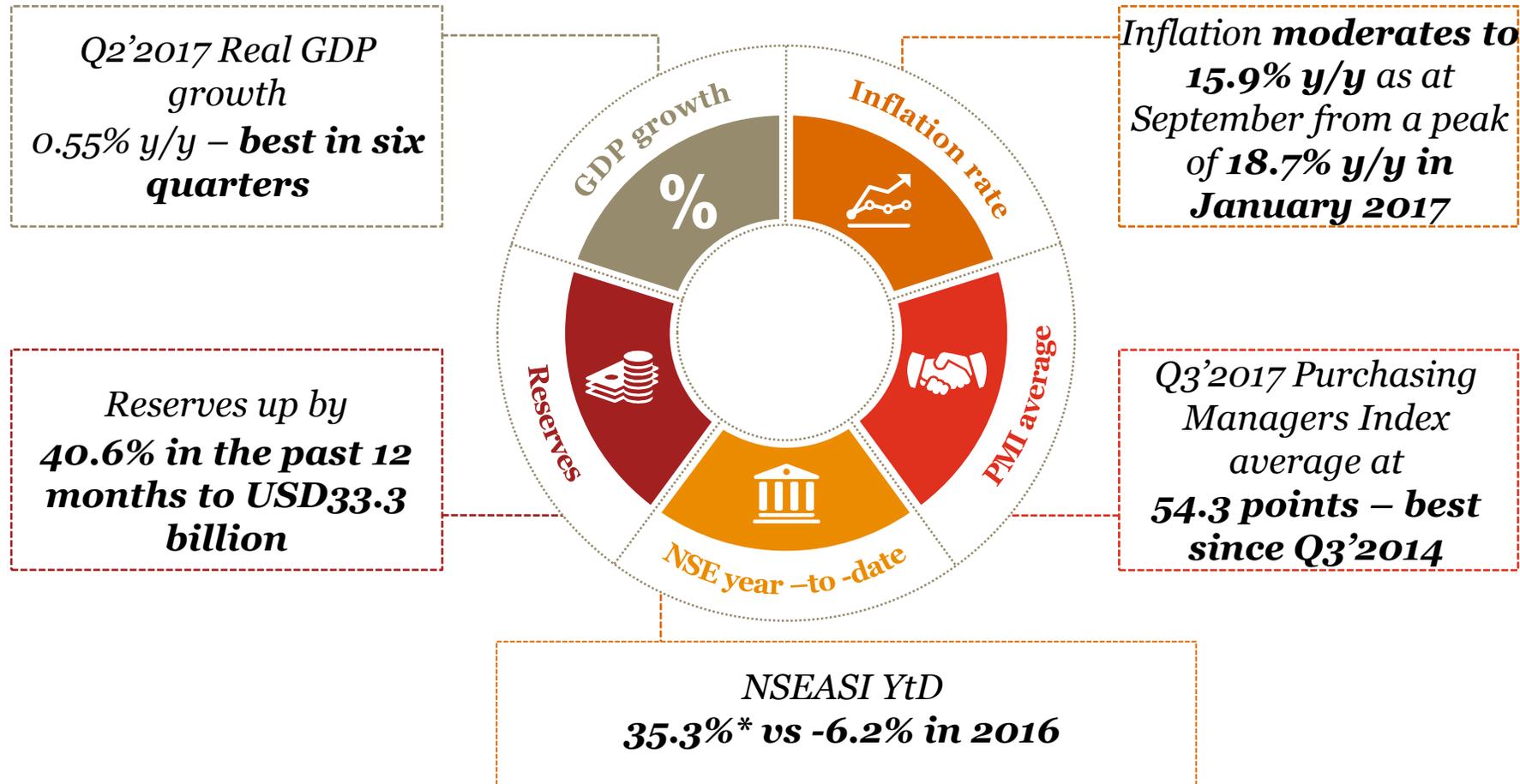
However, real GDP growth has fallen below population growth in the past two years, worsening the standard of living

Real GDP Growth and Population Growth



Source: CBN, PwC Analysis

The Nigerian economy has turned a corner; recent macroeconomic trends strongly suggest a return to positive growth by YE2017



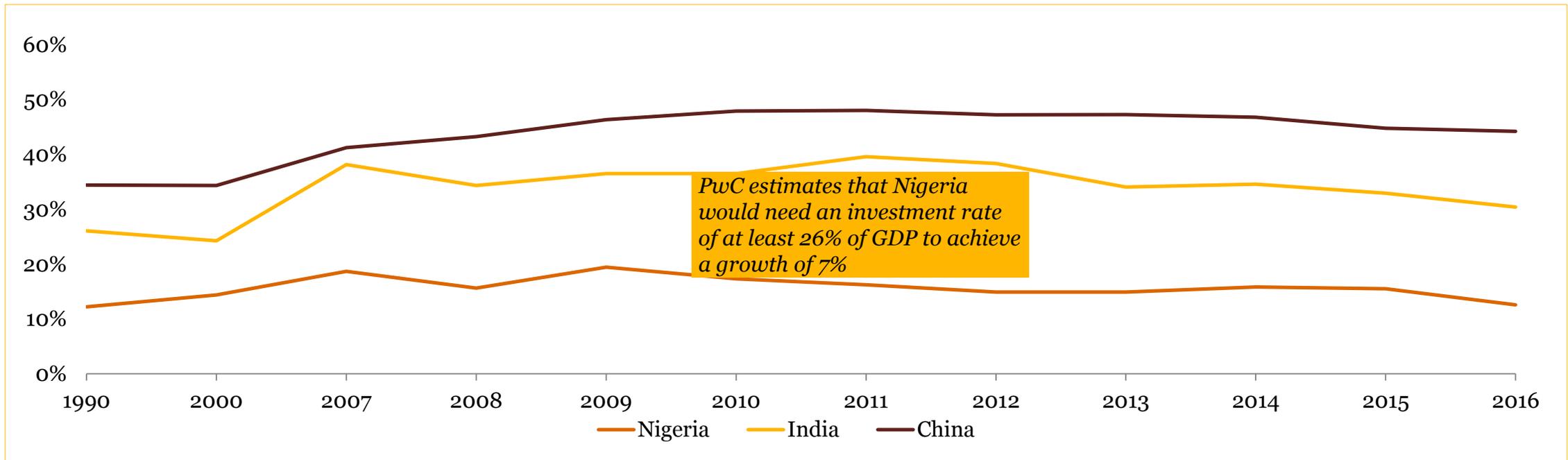
Source: CBN, NBS, NSE, PwC Analysis

PwC

- NSEASI YtD is as at 23 October 2017
- Reserves is as at 18 October 2017
- YE – Year End

With Gross Fixed Capital Formation at only 13% of GDP, Nigeria needs significant FDI to bridge the infrastructure deficit which is key to diversification

Gross Fixed Capital Formation to GDP

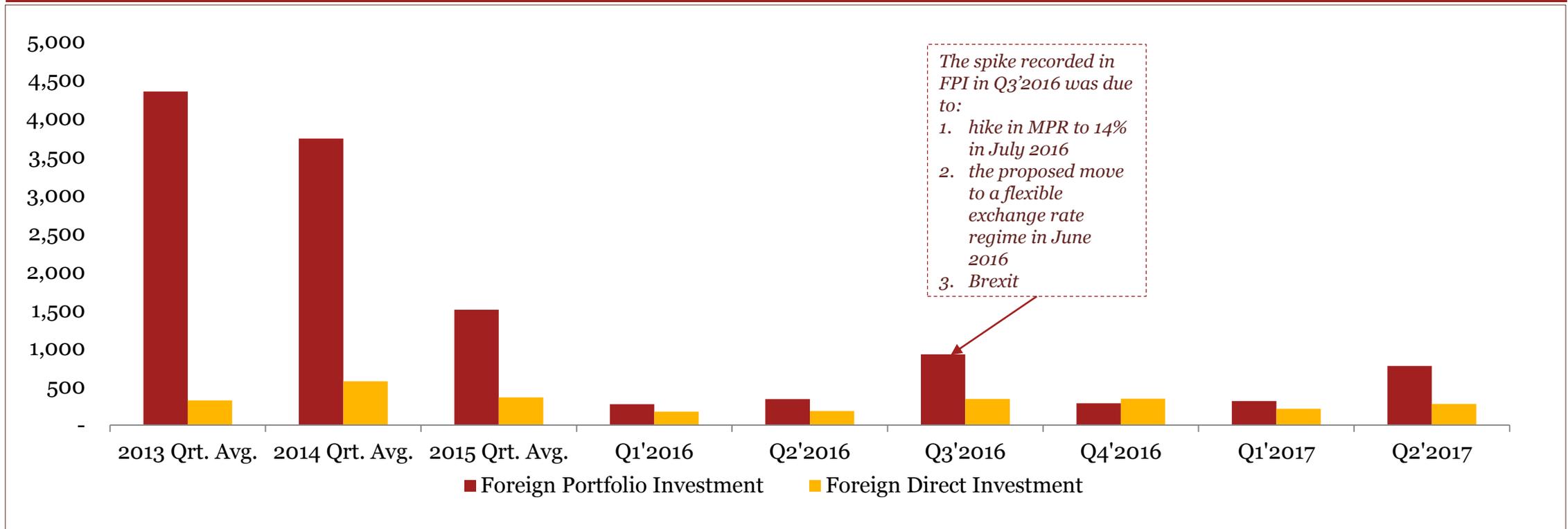


Source: World bank , PwC Analysis

Boosting Investments: Nigeria's path to growth - <https://www.pwc.com/ng/en/assets/pdf/boosting-investment-nigeria.pdf>

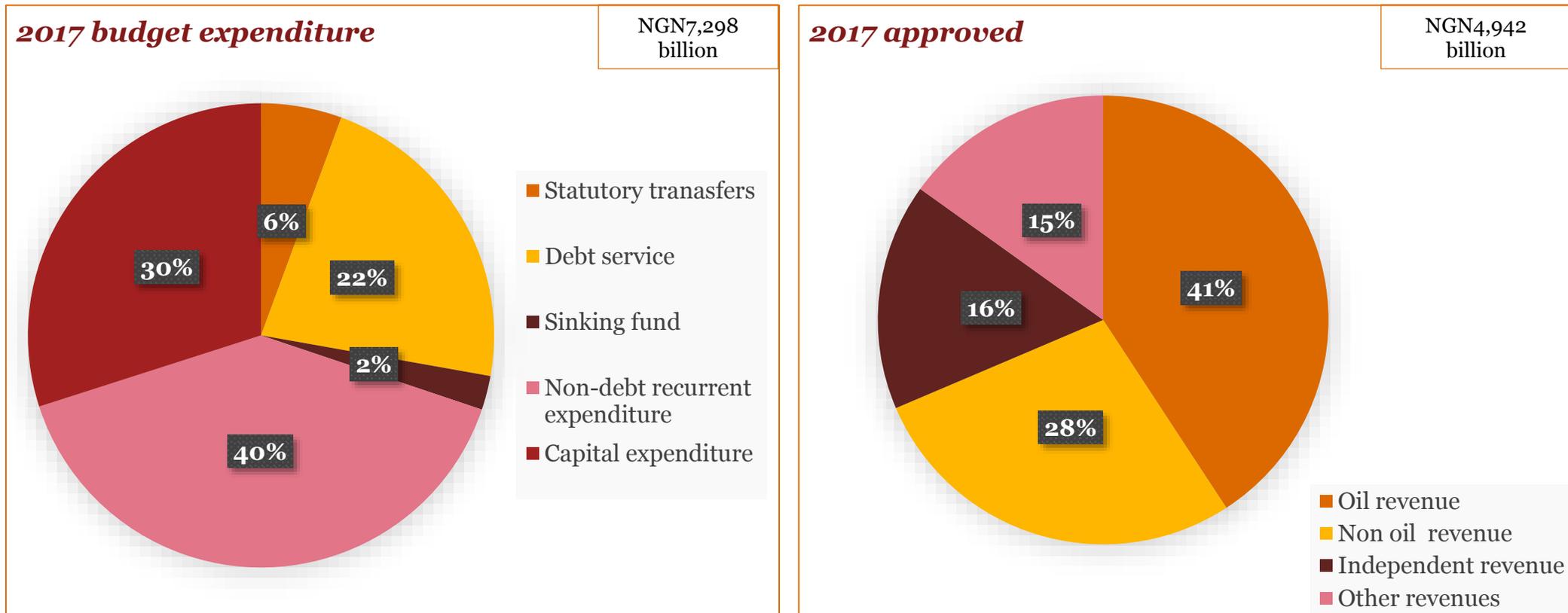
Though recovery is still fragile relative to pre-recession era, high yields continue to attract foreign investment in Q2'2017

Capital Importation 2013 - Q2'2017 (\$'m)



Source: National Bureau of statistics

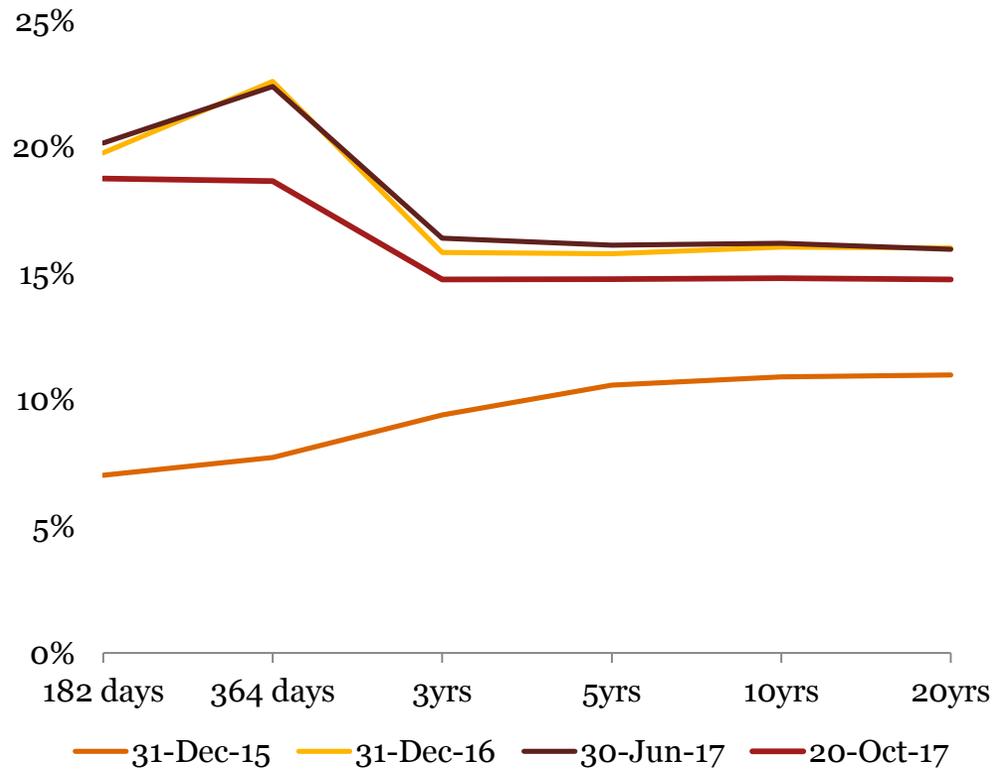
The Federal Budget is limited in its impact to deliver significant social and economic outcomes



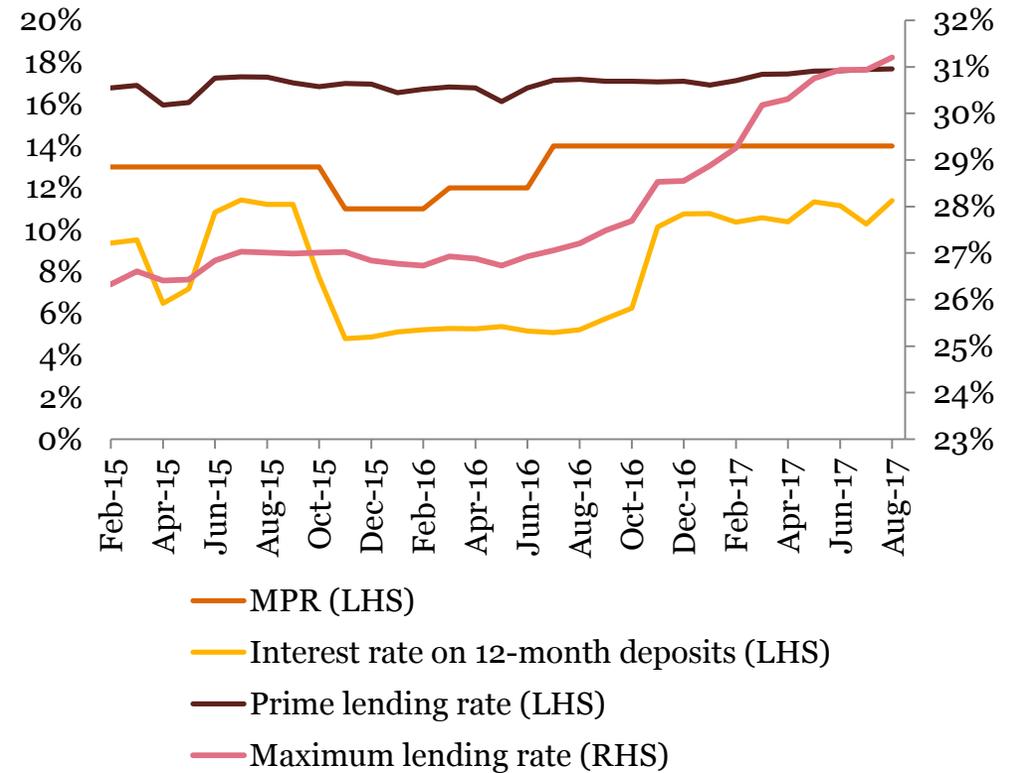
Source: Budget office, PwC Analysis

Yields and interest rates have remained elevated as monetary policy remains tight

Yield Curve



MPR vs. Lending Rates



Source: Central Bank of Nigeria, FMDQ and PwC estimates

Nigeria's public debt portfolio is heavily exposed to domestic debt which has become more expensive to service

Nigeria's Public Debt Stock as at 30th June 2017

	Domestic Debt (NGN' billion)	External Debt (NGN' billion)	Total (NGN' billion)
FGN	12,033.5	3,388.6 (USD11.11 billion)	15,422.1
36 States and the FCT***	2,958.5	1,189.5 (USD3.9 billion)	4,148.0
Total	14,992.0	4,578.1	19,570.1
Contribution (%)	77%	23%	
Cost of Debt <i>estimate**</i>	14.1%	1.9%	

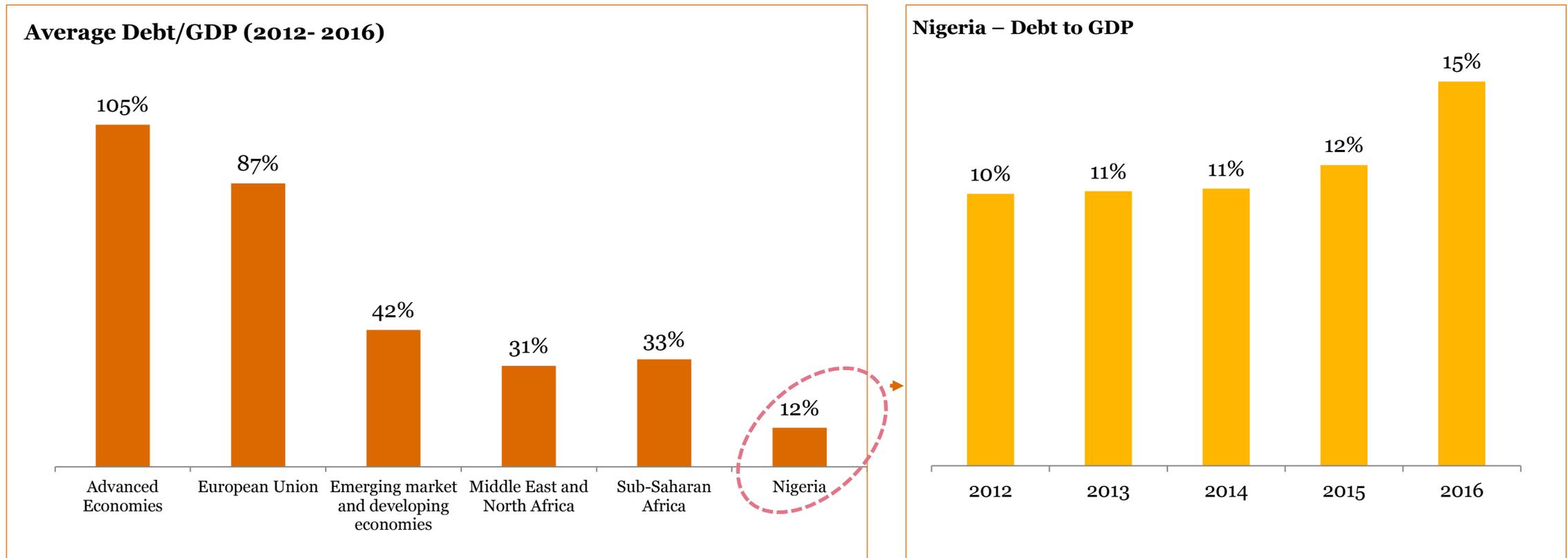
Source: Debt Management Office (DMO), PwC Analysis

* Computed at an exchange rate of NGN305/USD

** Estimated Cost of debt for year-end 2017

*** Domestic debt for sub-nationals is as at 30 December 2016

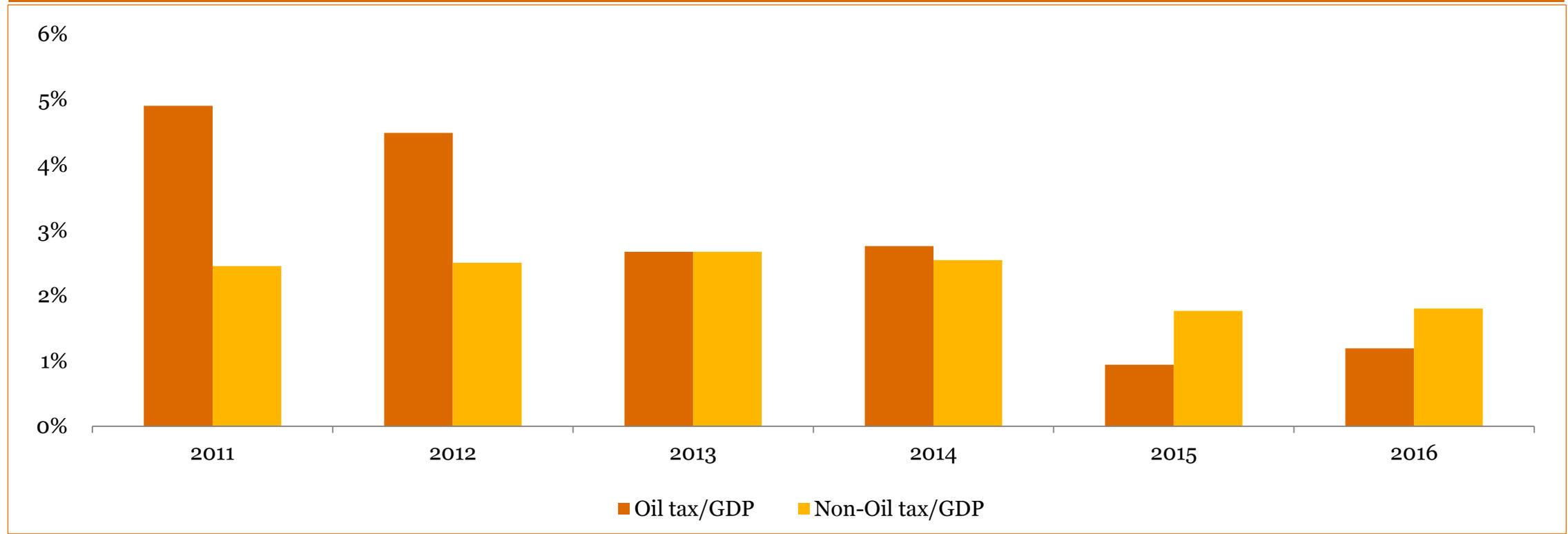
Debt to GDP remains comparatively low which gives Nigeria room to borrow to fund developmental activities



Source: IMF World Economic Outlook October 2016

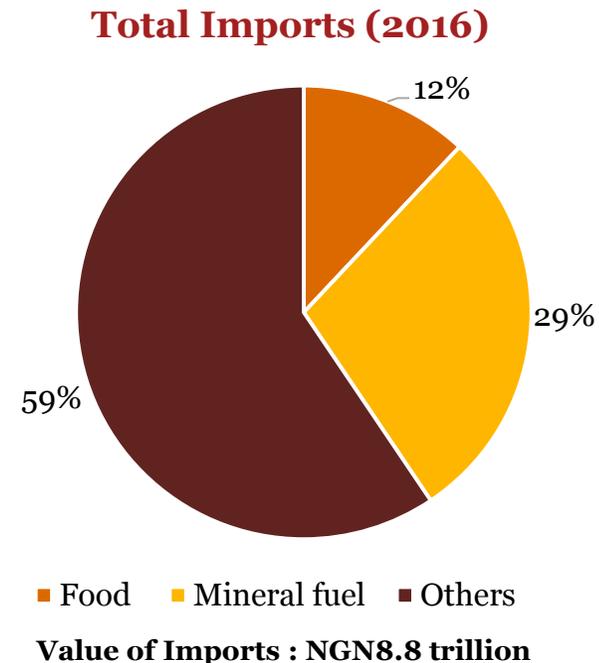
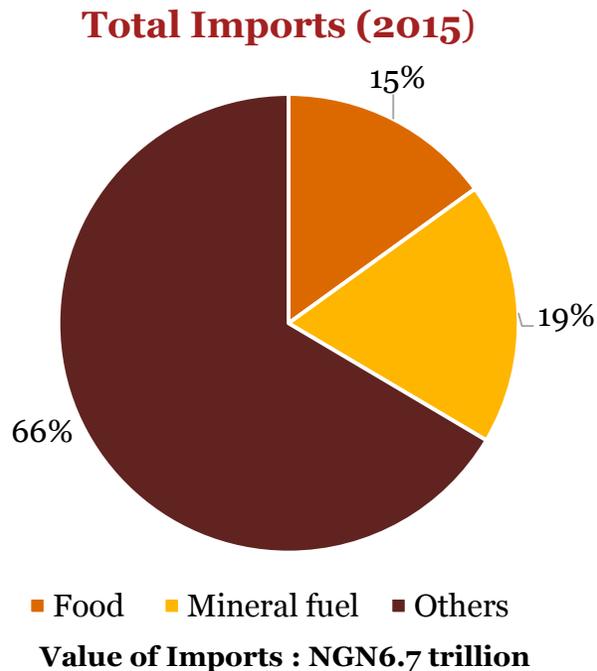
Historically low tax collection provides headroom to improve revenue collection, close fiscal deficit and reduce borrowing

Oil Tax/ GDP vs Non-Oil Tax/GDP



Source: FIRS, CBN, PwC Analysis

Diversification through development of value addition across the Agriculture and Downstream Petroleum would reduce demand pressure on Forex



- Petroleum and food products accounts for a significant portion of Nigeria's importation bill
- Through import substitution of agricultural products and improving value added in the petroleum industry, Nigeria's FX demand could reduce by **c.30-40%**

Source: National Bureau of Statistics

Nigeria ranks low in the Ease of Doing Business (EoDB) index compared to other large/populous countries globally and across Africa

- Nigeria currently ranks **169** (out of 190 countries) in the EoDB index. This ranking is significantly below the regional average rank of **143** for all 48 countries in Sub-Saharan Africa (SSA)
- In addition, this ranking places Nigeria in the **9th** position (out of 10), when compared to similar countries with large population sizes

Countries (Global Top 10)	Population (in Billions)	EoDB Ranking	EoDB Position
United States 	0.33	8	1
Russia 	0.14	40	2
Mexico 	0.13	47	3
China 	1.39	78	4
Indonesia 	0.26	91	5
Brazil 	0.21	123	6
India 	1.34	130	7
Pakistan 	0.20	144	8
Nigeria 	0.19	169	9
Bangladesh 	0.16	176	10

Countries (Africa Top 10)	Population (in Billions)	EoDB Ranking	EoDB Position
South Africa 	0.06	74	1
Kenya 	0.05	92	2
Uganda 	0.04	115 ^t	3
Egypt 	0.10	122	4
Tanzania 	0.06	132	5
Algeria 	0.04	156	6
Ethiopia 	0.10	159	7
Sudan 	0.04	168	8
Nigeria 	0.19	169	9
DR Congo 	0.08	184	10

Sources: www.worldbank.org, www.doingbusiness.org

Health Landscape in Nigeria

Since 1990, impressive advancements have been made on many health fronts globally

SDG Goal 3

Ensure healthy lives and promote well-being for all at all ages

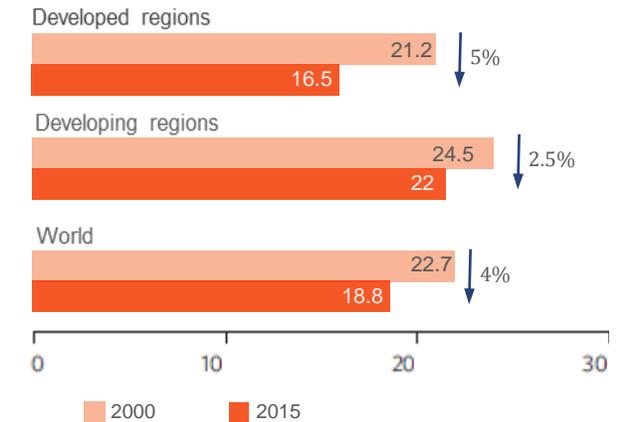
Under-five Mortality Rate¹



Estimated number of new HIV infections²



Probability of premature deaths from NCDs³



Source: United Nations SDG Indicators Global Database, Millennium Development Goals Report 2015 , PwC Analysis

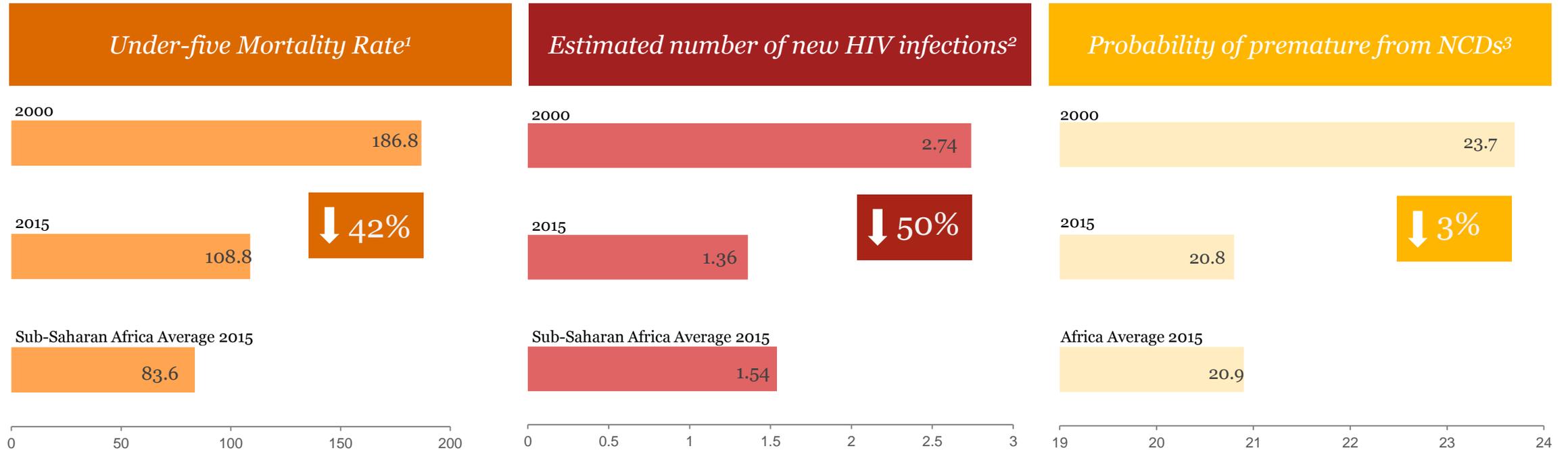
Supply Chain improvements have directly contributed to these enhanced outcomes

¹Deaths per 1,000 live births

²Thousands

³Probability of death between 30 and exact age of 70 from CVD, Diabetes, Cancer, CRD

Nigeria has fared marginally well in achieving desired global health outcomes...



Source: WHO Global Health Observatory, United Nations SDG Indicators Global Database, PwC Analysis

Planning and donor interventions in drug supply ensure medicines reflect local disease profile

¹Deaths per 1,000 live births

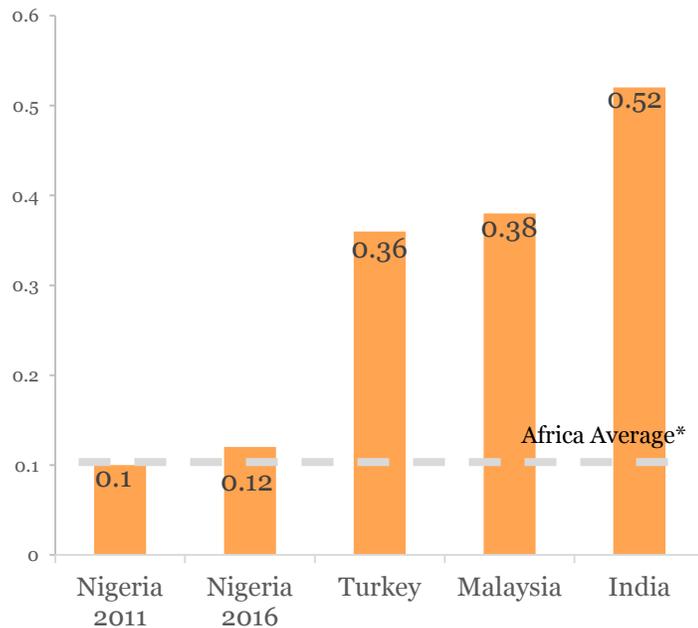
²Per thousands

³Probability of death between 30 and exact age of 70 from CVD, Diabetes, Cancer, CRD 19

However there remains a huge supply and financing gap across the health system

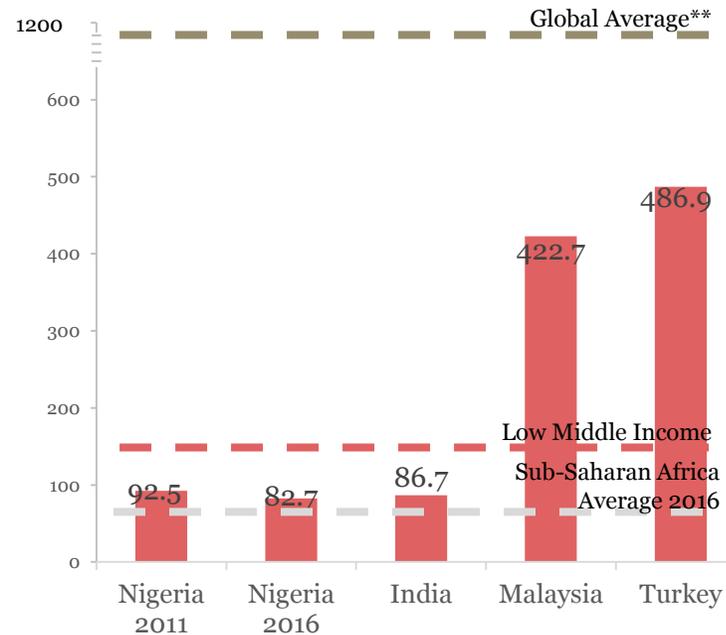
Number of Pharmacists to 1000 People

There are about 22,300 pharmacists in Nigeria, lowest amongst similar economies



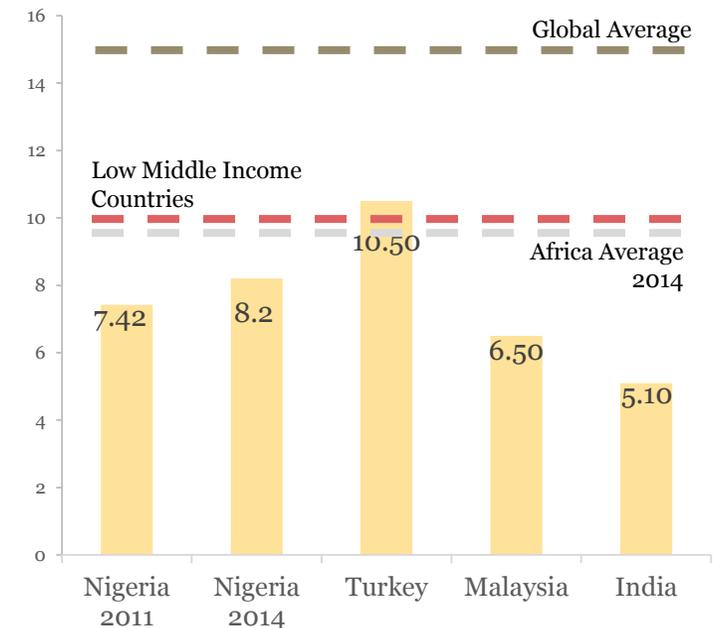
Health Spending per Capita \$US

Spending on health in Nigeria estimated to be one of lowest in the world



Health Spending to Total Government Spending(%)

Globally, governments spend nearly 50% more on healthcare than the private sector, the reverse is the case in Nigeria with very low budgetary allocation to health



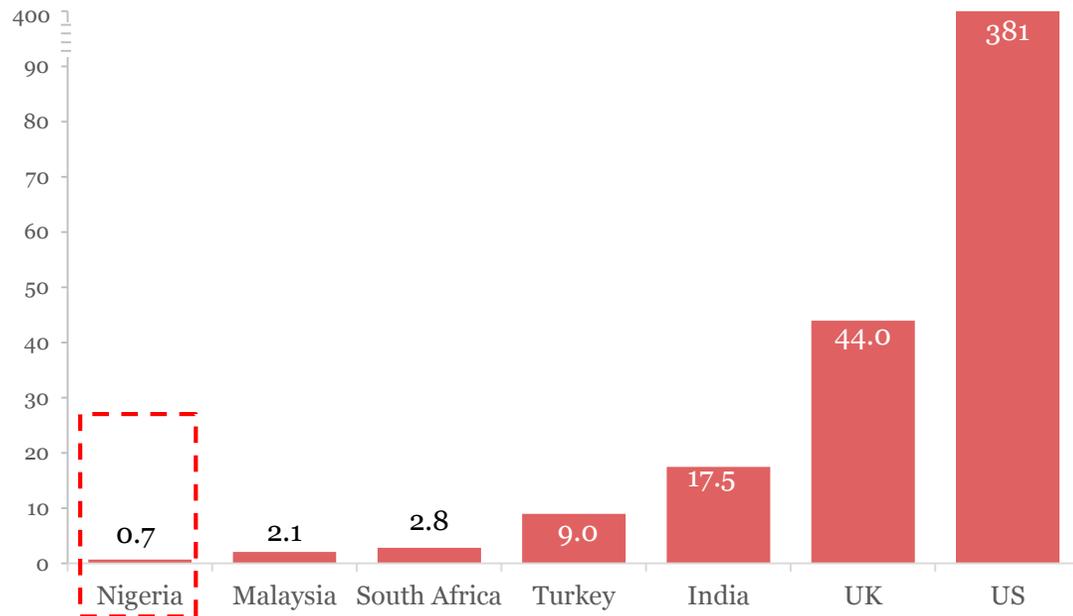
Source: BMI, WHO Global Health Observatory Database, PwC Analysis

...evident in relatively small pharma market in Nigeria

Access to high cost therapies drive pharmaceutical market in more developed markets

Pharmaceutical Sales in \$bn 2016¹

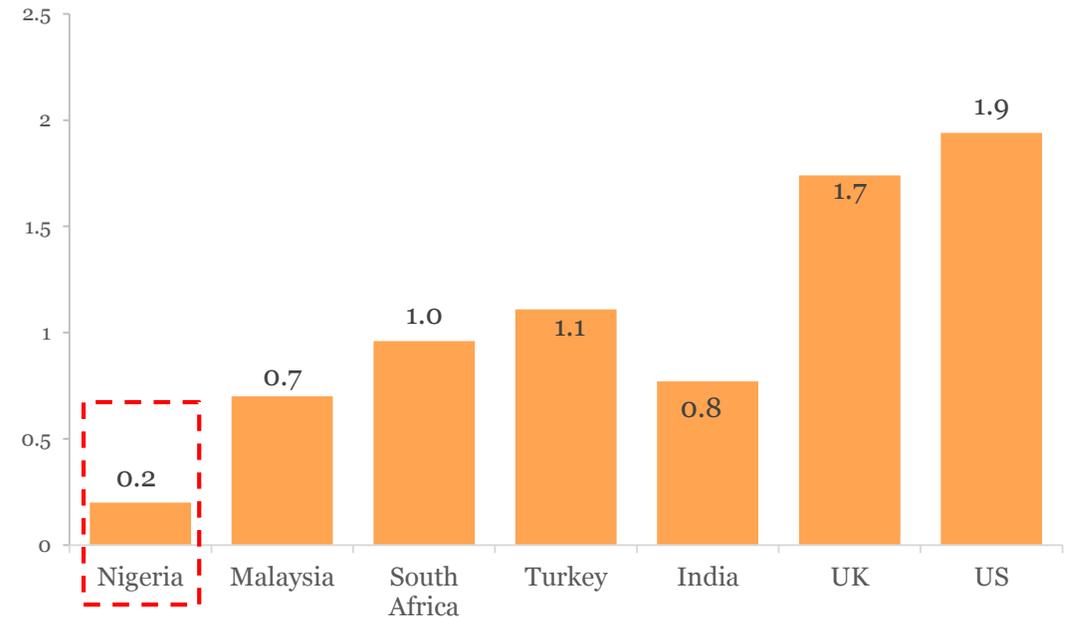
Pharma market is relatively small, occasioned by low purchasing power and limited financing



Source: BMI, PwC Analysis

Pharmaceutical Sales as % of GDP

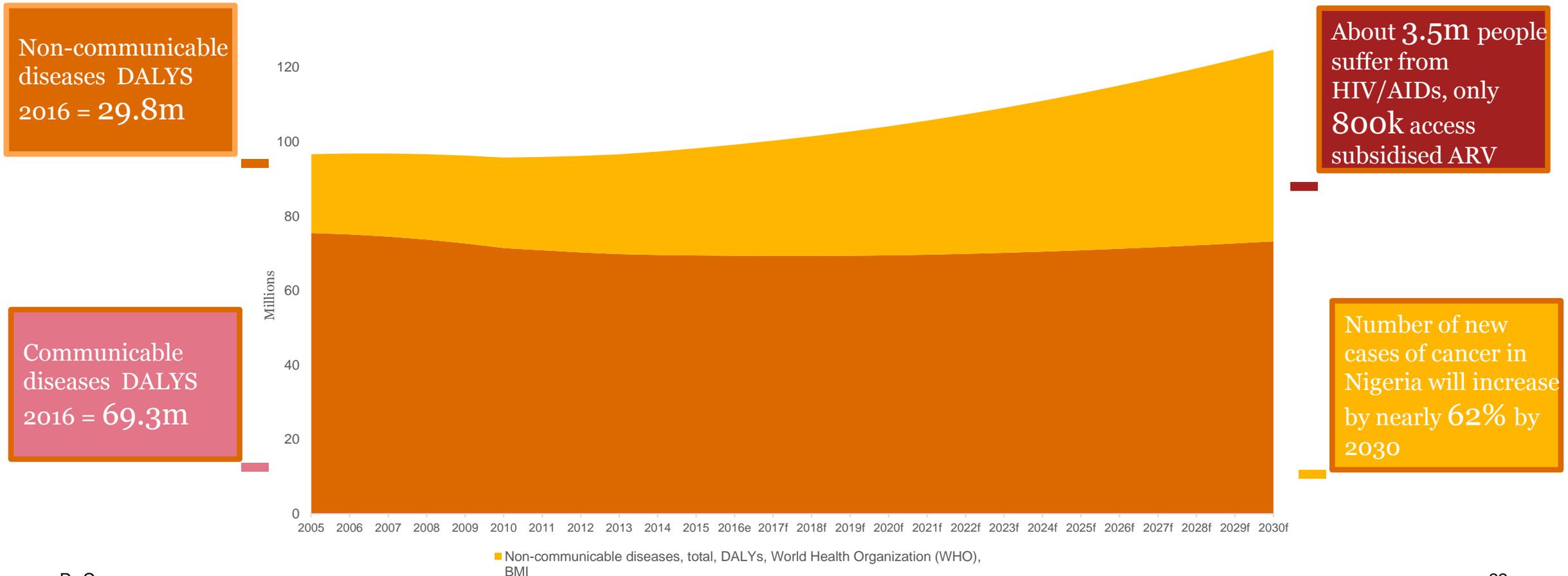
Total health spending is about 10% of global GDP with pharmaceutical sales being about 1.5%



¹Revenues generated by generic, patented, and over-the-counter (OTC) drugs through hospitals, retail pharmacies and other channels

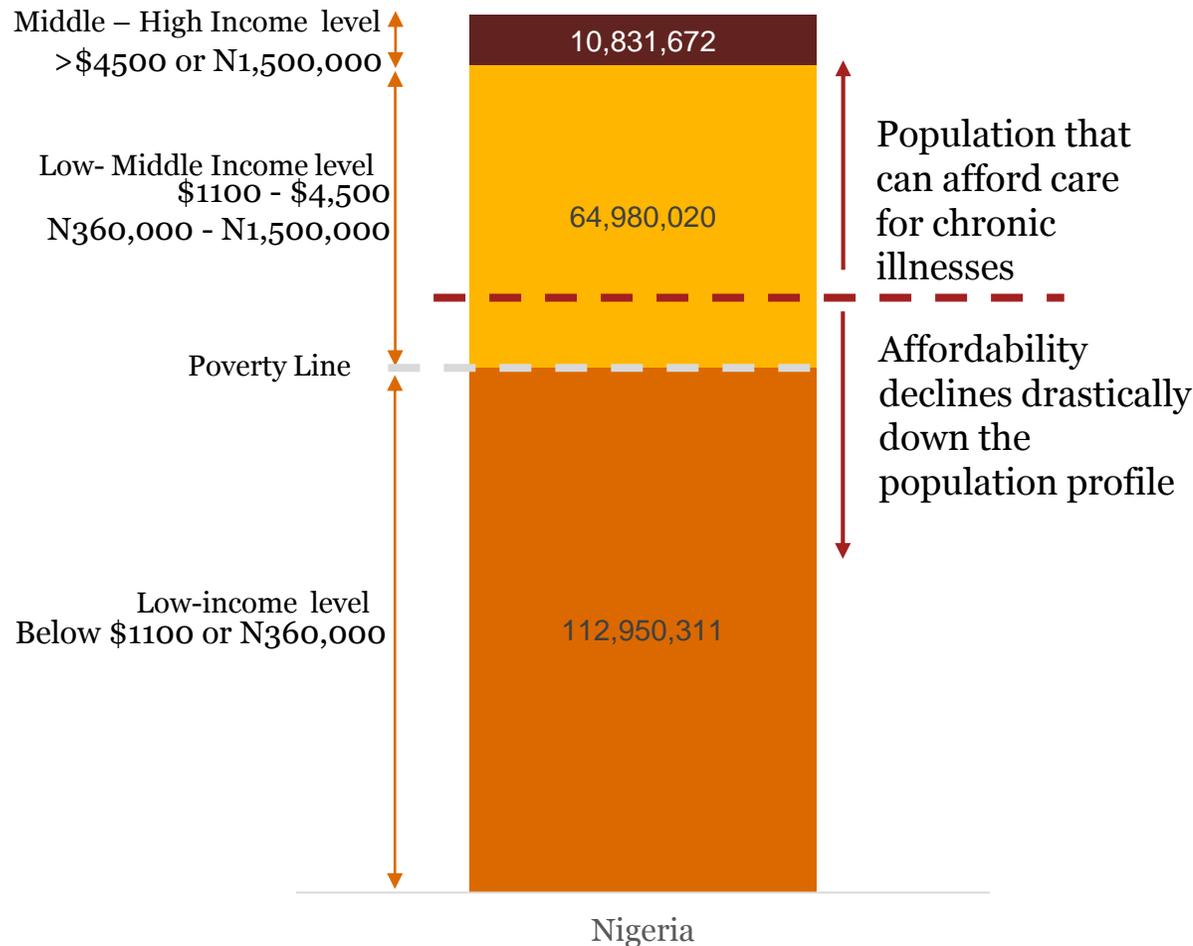
Nigeria disease map shows a double burden of increasing incidence of non-communicable diseases and still high incidence of communicable diseases

Projected Burden of Diseases in Nigeria



Access to essential medicines is yet threatened by high poverty rate

Population by Household Annual Income in Nigeria



Anti-diabetics costs N1500 for a 30-day supply of drugs, thus costs a minimum wage worker **2 days worth of work**

Cancer care costs about **5 times** the monthly minimum wage for a government employee

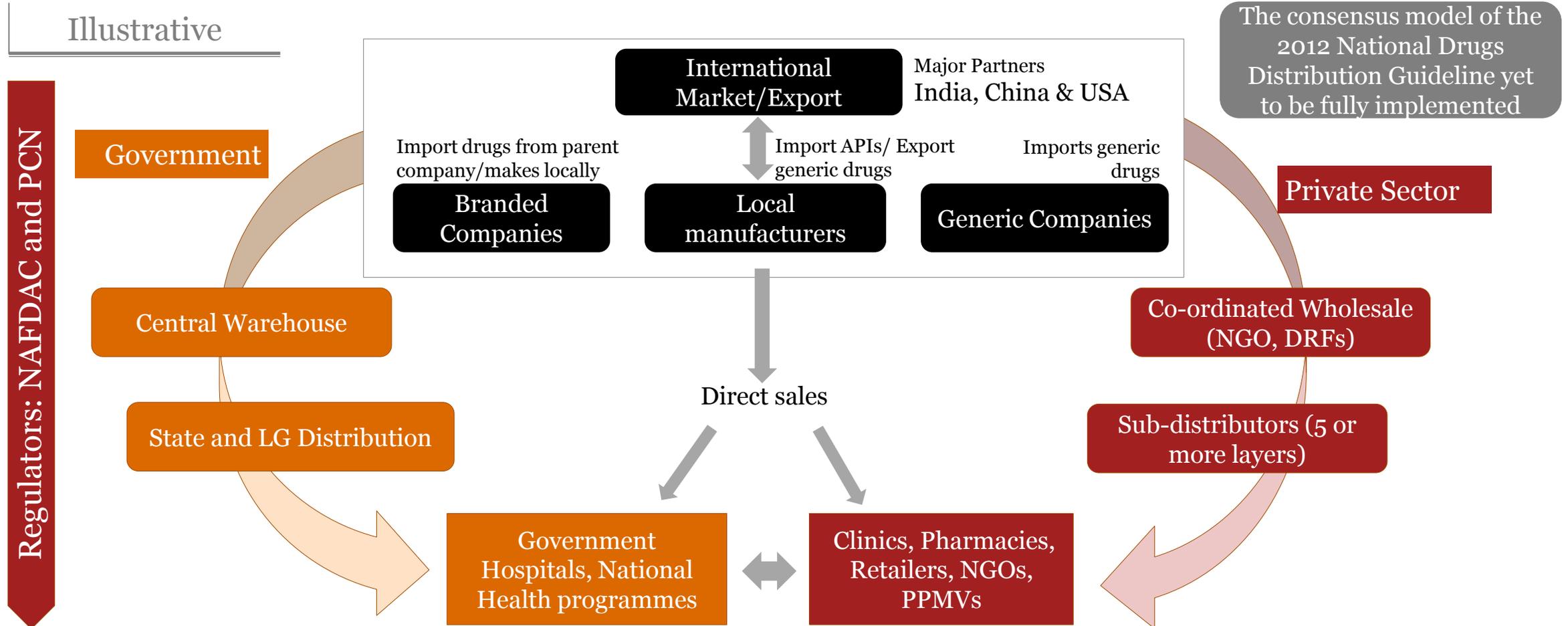
Anti-hypertensives costs about **half a day's work** for a month course of treatment

Please note that costs here are basic drugs and are based on pricing for most affordable generic products at private pharmacies; in reality a person may pay up to 10-15 times this cost in a private clinic. Thus, affordability was largely dependent on choice of therapeutic class, product or sector from which the medicine was purchased

Technology for Drug Security

Nigeria's medicine supply chain....

Illustrative



Threat of counterfeits and substandard low-price medicine is particularly predominant in the private sector

Key Players in the pharmaceutical segment...



The industry operates at below full capacity, despite the obvious demand for effective medicines due to widespread counterfeit trade in medicines

Counterfeits account for 17% of drugs in supply

17% of essential generic drugs and 30% of anti-malarials are routinely faked

A 2012 report found 64 % of antimalarial drugs to be counterfeit

Over 10,000 unregistered patent and proprietary drug stores



Private sector remains the main hub for counterfeit product AND main source of medicine for many Nigerians

34 Nigerian children died of kidney failure when a teething mixture found to be contaminated with diethylene glycol in 2008

NAFDAC seized NGN12billion worth of counterfeit drugs in 2016

NAFDAC has seized NGN29billion worth of counterfeit drugs in 3 years

NAFDAC has pioneered several authentication technologies targeted at fighting counterfeit drugs

On the back of technology adoption, circulation of counterfeit medicines dropped from **40%** in 2001 to **16.7%** in 2015¹



NAFDAC is the first regulatory agency in the world to use the Truscan



Mobile Authentication service



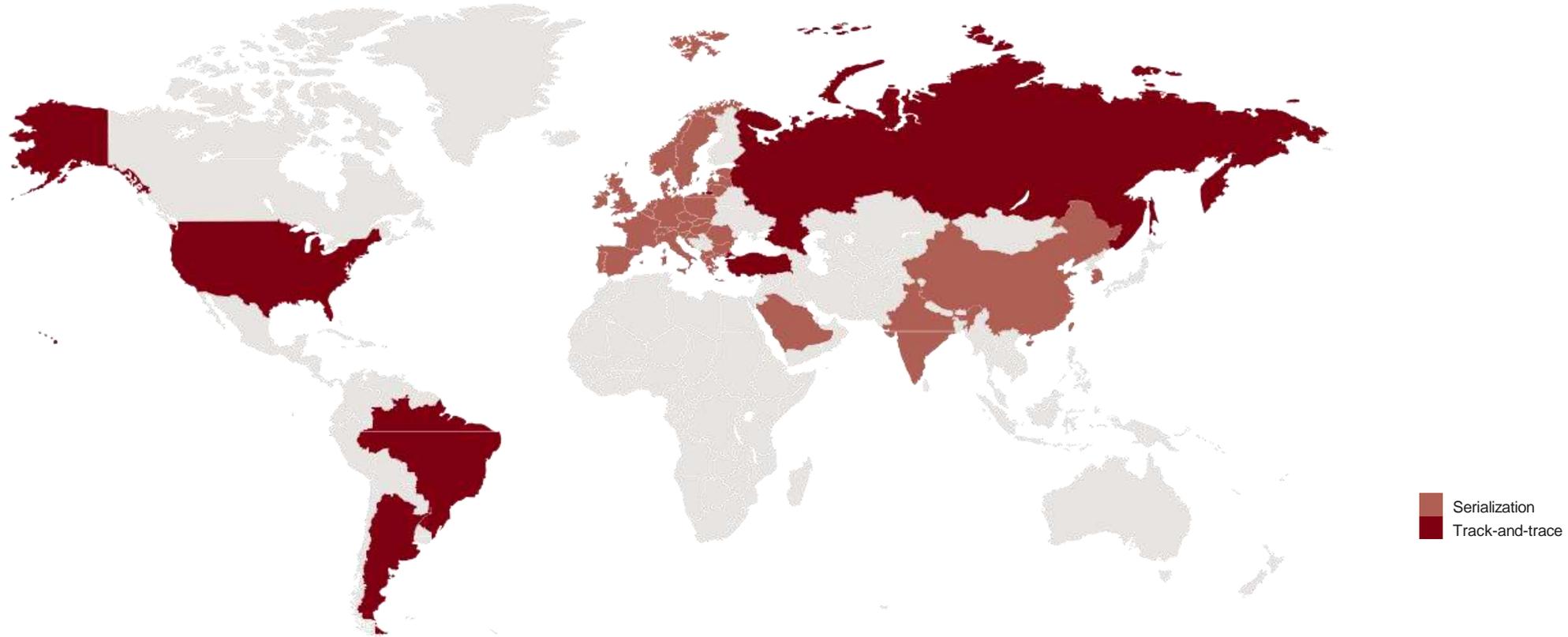
Radio Frequency Identification System to authenticate high-value brands



Black eye Infra-red scanners to enhance packaging security

More needs to be done in securing the supply chain end-to-end

A new mandatory method called “mass serialization,” often combined with “track-and-trace” requirements, is becoming the worldwide standard for regulators in securing the supply chain



Experts say the backing technologies may still be inadequate

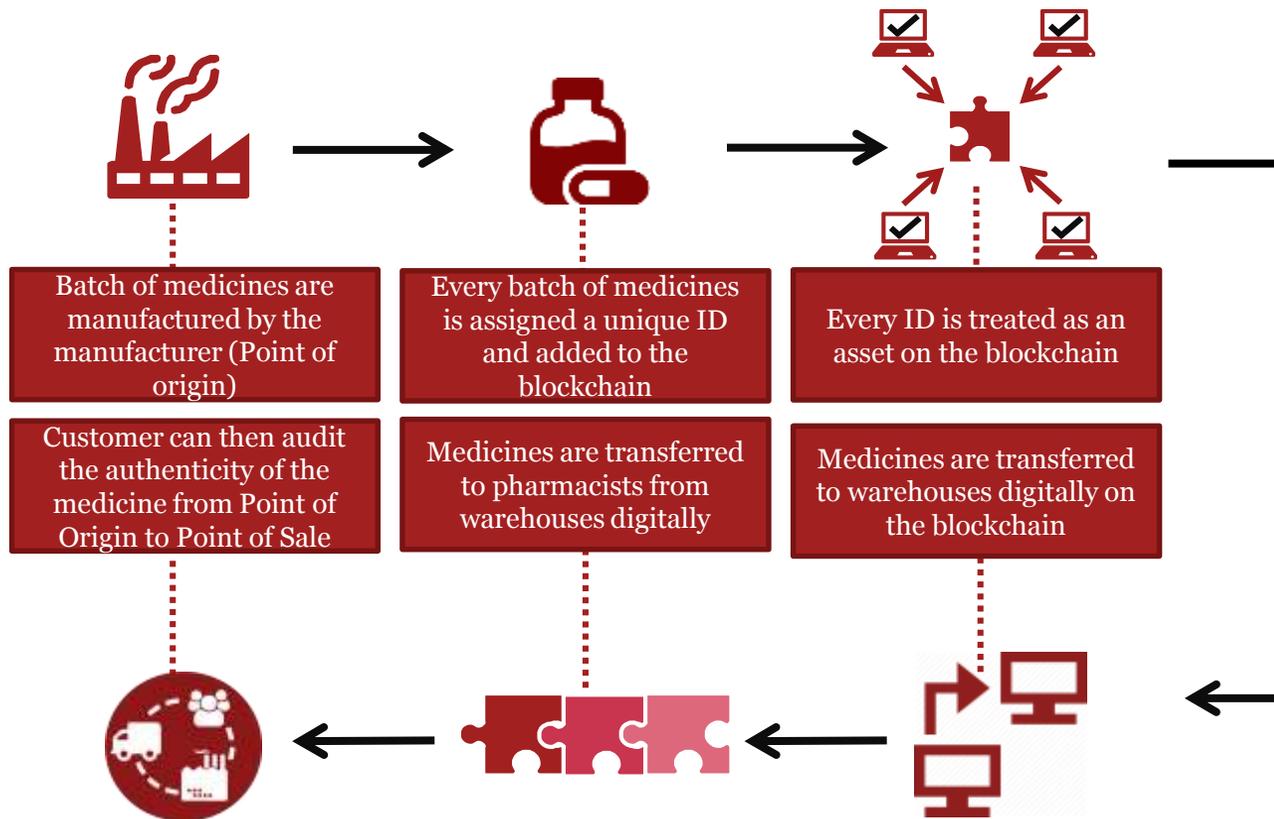
The use case for blockchain technology



https://youtu.be/9_Dvnz7aBRc

Supply chain integrity can be maintained by preventing counterfeit drugs based on the asset transfer concept on the blockchain

Supply chain integrity for medicines on the Blockchain



Behind the scenes on the Blockchain

Movement of drugs through the supply chain is analogous to transferring assets on the blockchain

Advantages



Impossible to counterfeit and immutable

01



Disintermediation and ease of transfer

02



Transparency and ease of auditing

03



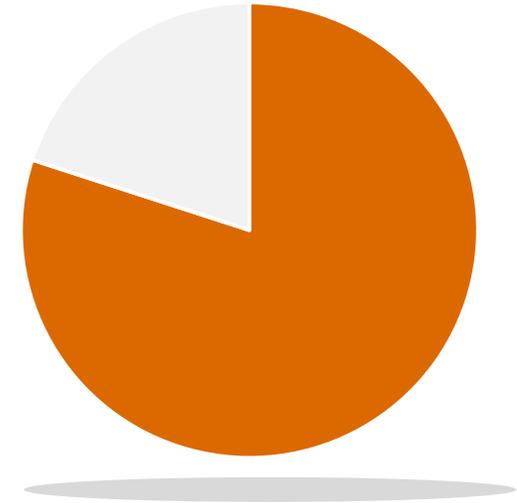
No overhead related to transaction processing

04

Many pharma/biopharma companies and governments are exploring blockchain technology, why can't we?

According to a Pistoia Alliance survey, **83%** of Senior Pharmaceutical and Life Science leaders are interested in blockchain and expect blockchain to be adopted in under 5 years

Pharma Giants such as **Pfizer and Genentech** recently announced they completed a medicine tracking pilot program, MediLedger Project, a blockchain tool used to manage pharmaceutical supply chains



The State of Delaware, in the USA, is implementing a blockchain initiative including a law that allows companies manage shares via distributed ledgers backed by blockchain; the state is also adopting blockchain in state governance and has streamlined record-keeping for corporates (filings) using the technology.

What else can be done?

Industry including pharma companies and the government, consider the following...

1

Mandatory licensing of patented drugs to improve access to essential treatments for NCDs and infectious diseases

2

Advocacy for increased funding for health

3

Get behind a system

Every pharmacist must also remember their duty



***Do NOT turn a blind eye to malpractices and counterfeits in the system.
Remember about 100,000 people die annually in Africa from fake drugs***



Provide pharmaceuticals in the best interest of patients

Thank You