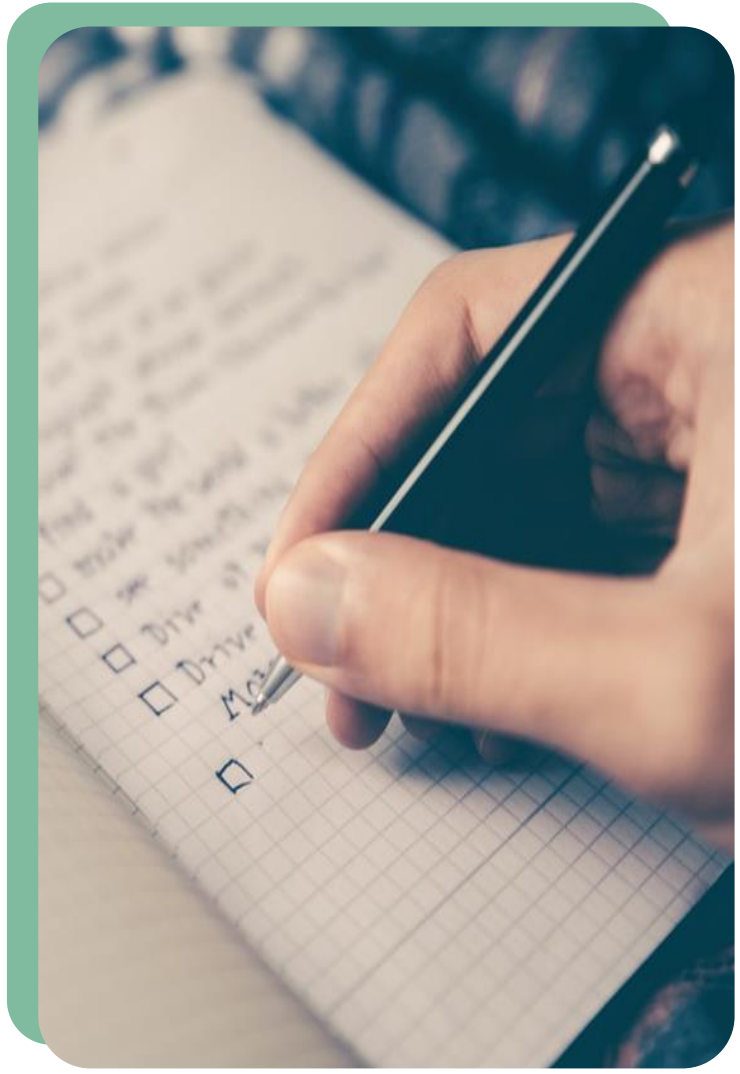
ALSTONIA IMPACT

How preventative health technologies scale in LMICs

Key lessons from 7 case studies, June 2022

Executive Summary

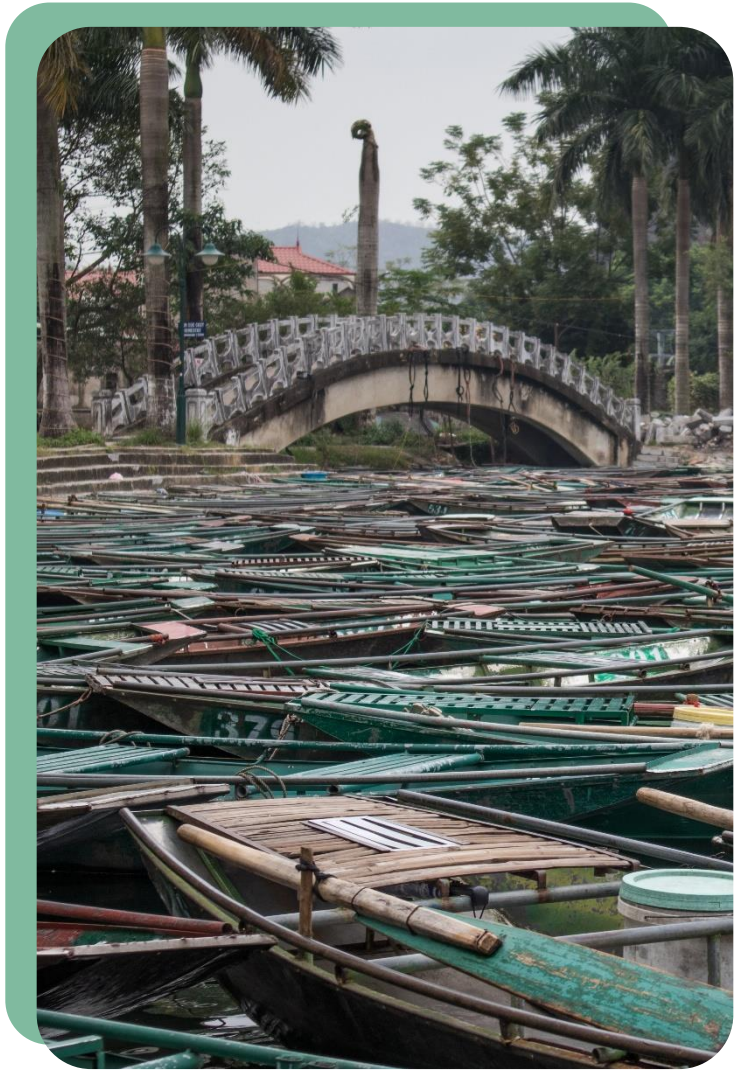
- Many life-saving preventative health technologies are available, but not all scale in LMICs. We looked at lessons from **7 successful case studies in LMICs to inform future scale ups**. This document is meant to be used by (1) developers of promising preventative health technologies which could be scaled up or by (2) donors/investors that provide capital and knowledge to support the scale-up of such technologies
- **Major customers / payors** of preventative health technologies tend to be **governments and multi-laterals**, but **private sector** can play an **important role**:
  - **Public sector** is typically the key customer at scale, since they focus on reducing societal costs of ill-health. Upper Middle-Income countries can often pay for the technologies themselves, while Lower Middle Income and Lower-Income Countries tend to receive support from multilaterals and pooled procurers, making engagement with these organizations critical
  - **Private sector** is likely to be much smaller segment in LMICs, but it can help building early trust in the product due to faster pathway to market. It can provide a better customer experience for a certain target populations. In some cases, it can also drive the scale-up if the right incentives are in place
- **Country interest** (public sector) in preventative health technology **may vary based on a range of factors**, such as political perception of the problem within the country, cost of technology and ability to use solution in the country (e.g., supply chain or personnel constraints)
- **The process from availability** of a technology **to roll out** in public programs in LMICs **is a long and complex one** which requires careful navigation. It typically includes local evidence generation, authorizations by local technical bodies, health technology assessment by governments or international gatekeepers to assess if public money should be spent on the technology, and if recommended, public roll-out along with demand stimulation. Processes in each country can be very specific to country context and to the technology involved
- To navigate the complex process, **successful scale ups required collaboration among various players** who play unique roles in the ecosystem. Key groups in the ecosystem (funders, alliances, technology developers who were typically corporates, low-cost manufacturers, pooled procurement organizations and NGOs) worked together with governments to drive scale ups
- The following 2 pages **contain tailor-made summaries for technology developers/their collaborators and for donors/impact investors** of the most relevant topics which, according to us, should be considered and addressed to scale up a new technology in LMICs



SOURCE: Alstonia Impact analysis

Technology developers and partnering organizations such as NGOs should take these key factors into consideration

FOR TECHNOLOGY DEVELOPERS AND PARTNERS



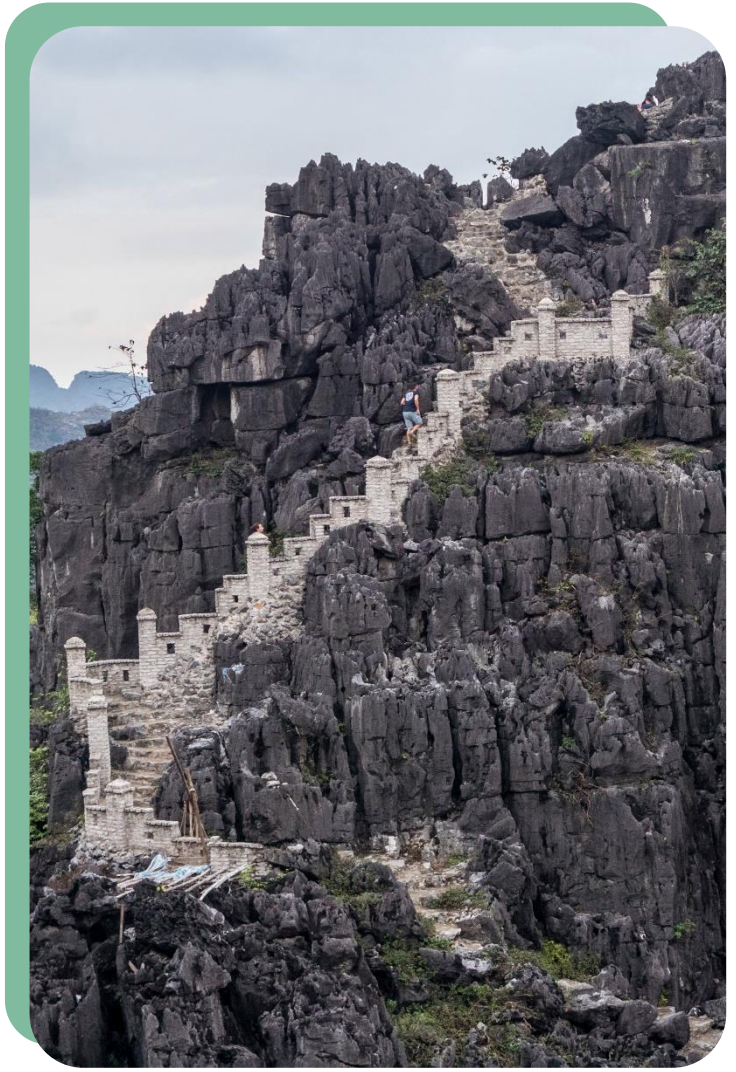
- **Liaise with global alliances and organizations (often non-profit / multilateral)** who are working on the issue to raise its profile, define target product profiles and costs, raise financing and generally foster collaboration
- **Identify a few focus LMICs** to create success stories and momentum: among high-burden countries, prioritize by size of market, political priority (not always linked to scale of problem), ability to pay (via own resources in middle Income countries, and via donor support in LICs), technical suitability of product for country conditions, complexity of regulation, complexity of operations and availability of partners
  - **Do not ignore the private sector in target LMICs and engage opportunistically**: in several LMICs, richer populations may have the ability to pay for the product. Local presence in the market could pave the way to public purchase if benefits are visible
- **Partner with in-country NGOs or local companies** who are usually best positioned to facilitate collection of local evidence of its effectiveness, identify pilot sites, and advocate with regulatory authorities and governments. They can also guide on likely price points at which governments / donors would consider purchase
- **Adapt product to meet target price points** in selected countries
- **Understand regulatory requirements** for target countries, trigger the process as early as possible along with partners. Recognition from major authorities like WHO and FDA is a major enabler and even a prerequisite for several countries. Some countries also require recognition from local authorities or production from within the country. If it is the case for any of the target countries, trigger the relevant processes as well
- **Connect with government stakeholders** (especially for medium-income countries) **and with major grant givers** (especially for low-income countries) to understand funding options in terms of timing and of size. Identify the right level of government to engage with (municipal / village / state / federal or some combination of these)
- **Optimize operational model to deliver technology in the last mile settings:**
  - **Leverage existing networks or programs for distribution** (e.g., vaccination centers) when possible; door-to-door is an option only if nothing else is available. Non-medical staff can be used after appropriate training. Private sector companies can also be a potential distribution channel to reach the target customer (e.g. partnering with Uber/GoJek to distribute, gas stations with a network covering the whole country, etc.)
  - **On-board local communities** as early as possible in the process, leveraging people from local villages or influencers. Tailor all communication material to local needs and expectations (e.g. local language, clear visuals resonating with people, etc.)

SOURCE: Alstonia Impact analysis

Donors and philanthropists can play a salient role in the scaling up preventative health technology in LMICs

FOR DONORS/FUNDERS/IMPACT INVESTORS

- **Invest in global alliances and organizations** who work on the issue to raise its profile, define target product profiles and costs, raise financing and generally foster collaboration
- **Early in the technology's journey:**
  - Fund the development of the core technology and allied technology (e.g., delivery technology, storage technology in field) in lab-setting
  - Partner with grantee / investee to select a limited number of LMICs to focus on
  - Fund local / international NGOs that help generate evidence in real-world settings
  - Fund organizations for navigating through regulatory systems (FDA, local authorities) and other gatekeepers globally (WHO) and in selected LMICs
  - Fund efforts to discover optimum and cost-effective operational models ("how, where, and by whom will it be deployed"?) in key LMICs
  - Fund early advocacy efforts
  - Fund demand studies to crowd-in more commercial / philanthropic capital (if possible)
- **Later in the technology's journey (including tech already available in high income countries):**
  - Beyond $, use voice to engage with large corporates with technologies to increase access for LMICs
  - Support organizations that work on pooling / coordinating procurement efforts providing funds for their operations; more generally, support any efforts that bring more private sector participation in the market as a buyer, or seller / distributor
  - Consider providing volume and other guarantees that can increase the supplier base and reduce prices; if no other mechanisms are possible, pay for procurement of technology and its distribution at negotiated prices along with other donors
  - Fund demand-stimulation activities
  - Fund continued advocacy efforts
- **Coordinate with other large donors to avoid duplication**
- **Consider backing relevant impact venture funds as Limited Partner**



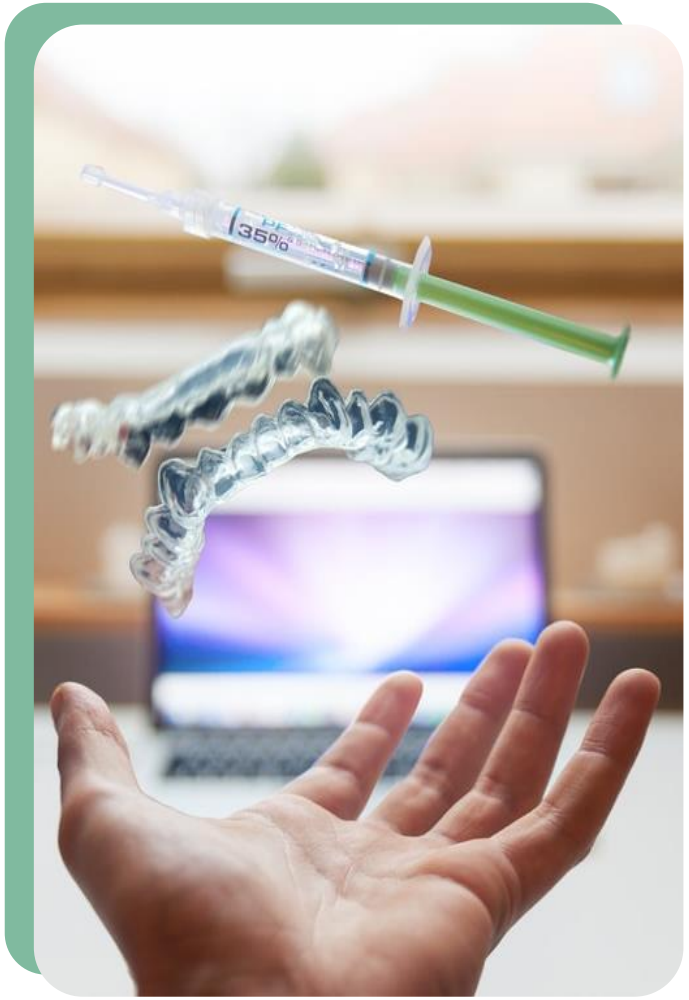
SOURCE: Alstonia Impact analysis

Agenda

- **Key insights from case studies**
- Deep dives on selected technologies
- About Alstonia Impact & Authors
- Glossary

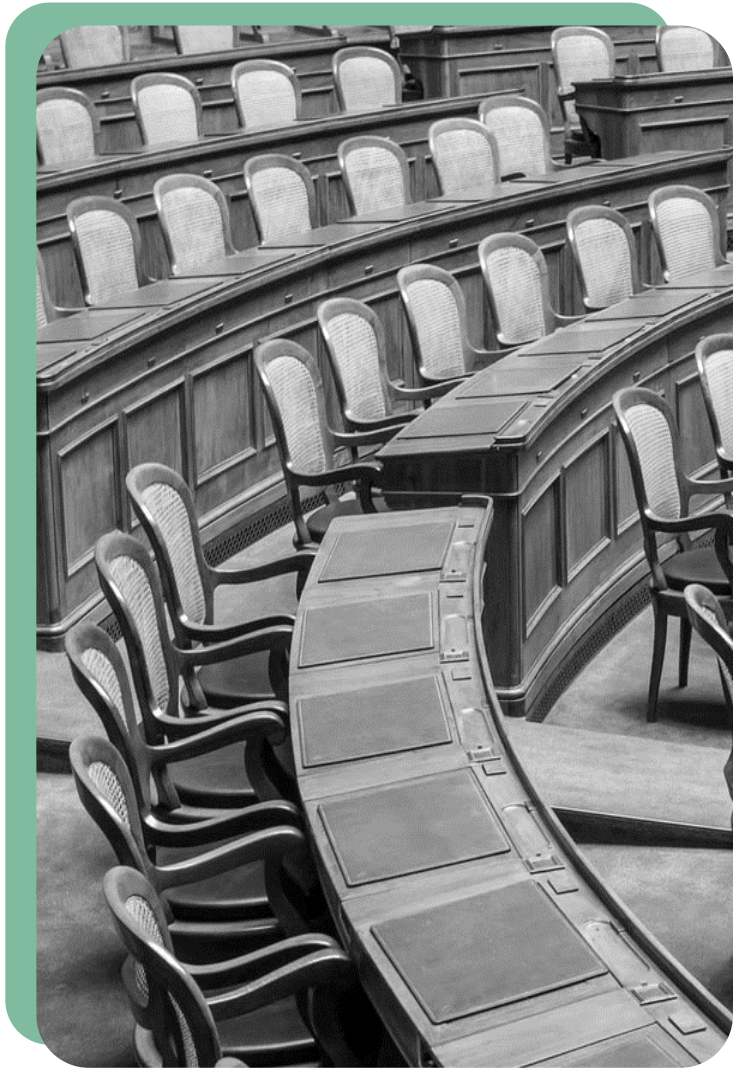
Many life-saving preventative health technologies are available, but not all scale in LMICs. We looked at lessons from 7 successful case studies in LMICs to inform future scale ups

- Over the past century, we have seen incredible improvements to DALY/QALYs taking global life expectancy from 31 years in 1900 to 73 years in 2000
- Preventative health technologies have contributed significantly to these improvements
  - These range from simple tools (e.g., car seat belts, handwashing soap, mosquito nets) to more sophisticated technology (e.g., vaccines for smallpox, DPT, polio, safer childbirth technology, contraception, etc.)
  - Many preventative health measures do not include a technology component. For example, taxes can play a key role to reduce tobacco and alcohol abuse. While all of these are important tools by themselves, they are out of scope for this document
- Yet, preventative health technologies do not scale evenly, and are especially slow to roll-out and scale in LMICs – this is apparent in the higher DALYs and lower life expectancy in LMICs compared to high income countries
- We looked at 7 case studies from **distinct health areas (vector-borne diseases, nutrition, reproductive health, water and sanitation, respiratory health and NCDs)** that *did* scale in LMICs to draw and summarize lessons for future scale-ups[1]
- **This document is meant to be used by**
  1. developers of promising preventative health technologies which could be scaled up
  2. donors/investors that provide capital and knowledge to support the scale-up of such technologies



The following criteria were used to select case studies a) Preventive: is it to prevent a disease or a condition? (i.e., not to cure it) b) Technology: does it have a substantive technology / know-how component? (i.e. not a tax such as for tobacco, specific regulations, information campaigns, subsidies, etc.). c) Scale: was it already scaled to cover at least a major region? (e.g. >25 M people) d) Recent: is it a relatively recent technology? (I.e. scaled up in the last 20 years) e) Health areas: does it represent a distinct area within health?
SOURCE: Alstonia Impact analysis

Major customers / payors of preventative health technologies tend to be governments and multi-laterals, but private sector can play an important role



- Given the nature of preventative health interventions, individual demand was generally low in the examples we looked at. For this reason, the **payor of the product was usually different from the person who is receiving the product** (e.g. majority of populations in LMICs receive vaccines for free or at subsidized rates, the payors were usually governments or government-backed insurance players)
  - For most of health-related prevention technologies, **the public sector was the key customer** at scale – this is not a surprise as a governments are natural "buyers" of preventative health since they focus on reducing societal costs of ill-health. For many disease areas, countries create national action plans with WHO guidance which include preventative measures
  - The **private sector was smaller** due to lower number of affluent customers in LMICs and underdeveloped private insurance markets. Despite this, it **represents a crucial segment** as 1) it helps early trust in the product e.g. injectable contraceptives, bed nets, rotavirus and HPV vaccines were all available first in the private sector in larger LMICs 2) it may provide a better customer experience e.g. many women in Colombia drove sales of injectable contraceptives in pharmacies (~20% of total volumes) due to higher **confidentiality,** the provision and linkage with **microcredit** network in Bangladesh made it easier to purchase improved cooking stoves
- **Within the public sector, the path to market differed by country income segments**:
  - **Middle Income Countries** such as Mexico and Brazil were able to pay for the technologies using their own funds. The **sources of government funds may not be easy to identify:** funds can come from budget allocated to different related institutions (e.g. ministry of health, of education or of family), or they can be re-allocated from other non-related uses (e.g. re-prioritization by governments or unused funds from previous years). For example, in Mexico for the Rotavirus vaccine, the costs were spread among 3 different public institutions. In some lower middle income countries, richer states took the lead in adoption. (e.g. Delhi state for HPV vaccine in India)
  - In **Low Income Countries**, **multilaterals-led pooled procurement efforts** have been more critical, rather than direct sales to governments. The first customer to be convinced were often such organizations, who then work with LIC governments. e.g. Global Fund/UNICEF support for bed nets, GAVI/UNICEF support for Rotavirus and HPV vaccines, UNFPA for injectable contraceptives)
- Countries may choose to scale up **based on political priority of problem**, costs of implementation, and suitability of technology for their setting

Deep dive on next page

SOURCE: Alstonia Impact analysis

Deep dive: Country interest (public sector) in preventative health technology may vary based on a range of factors

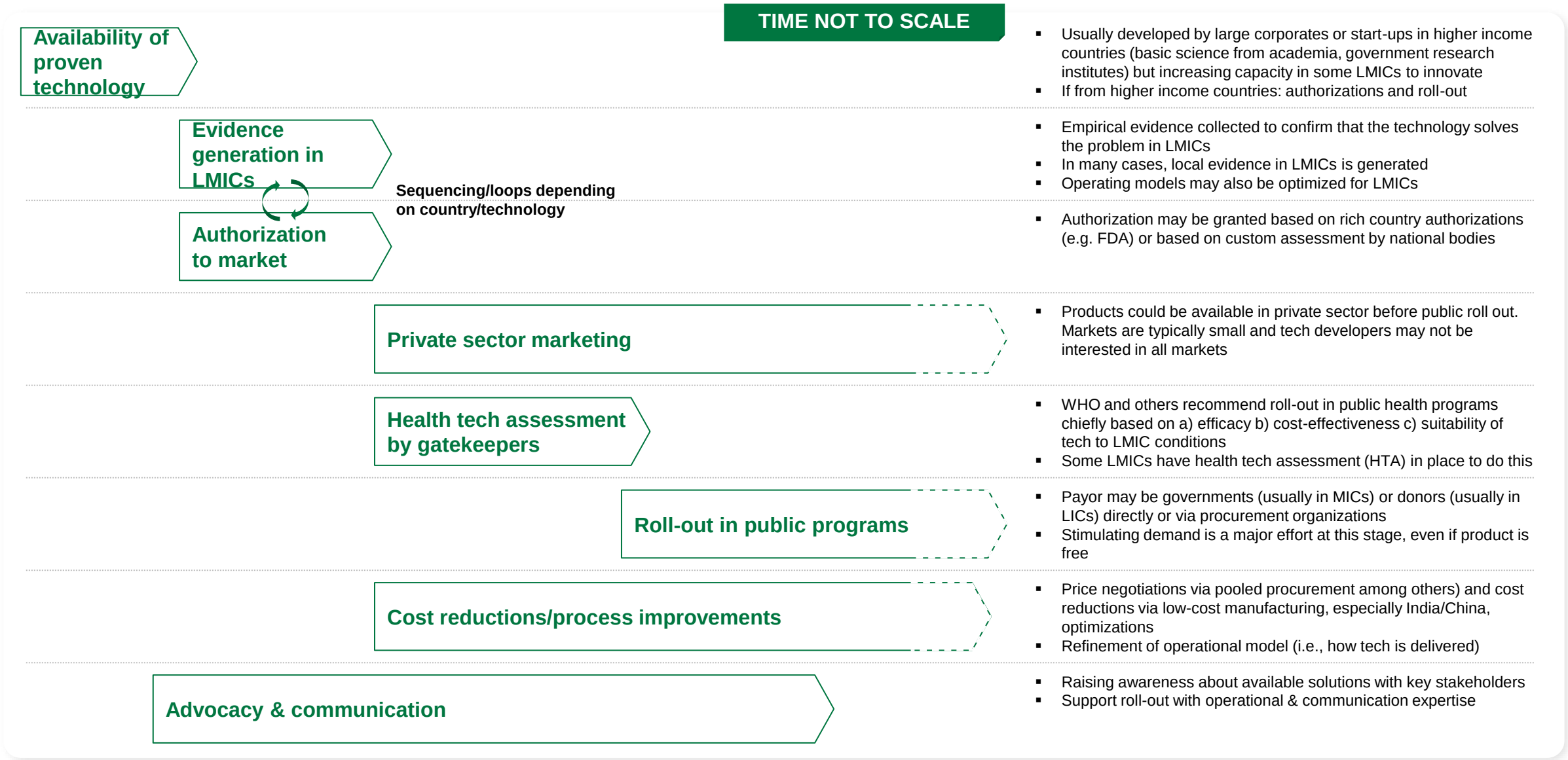
Factors that influence countries interest in uptake of technology include

- **Political perception** of the problem within the country:
  - High political salience got Egypt to act against Lymphatic Filariasis (LF), India and Bangladesh for cleaner cooking technologies. Issues that also affect the urban affluent in LMICs get higher political mileage (mosquito borne diseases such as dengue)
  - Major international organizations such as the WHO can influence priorities of government as can advocacy on issue. For nearly all technologies we studied, a WHO recommendation was call to action for countries to address the issue
  - Public perception (even small influential groups) of technology can play a large role. E.g. hormonal contraceptives took longer in India due to heavy litigation
- **Cost of technology**: full costs of the technology, i.e. including cost of the delivering product to citizen, is a major factor in country / multilateral decision making. In Argentina, a middle-income country, the HPV vaccine was rolled out in the national program only when price dropped to <15 USD under a PAHO facility. Rotavirus vaccine was introduced in the India public vaccination schedule only when a local cheaper, locally manufactured vaccine came to the market. Drug donations for LF / mass deworming also increased acceptance of intervention in many LMICs
- **Ability to use solution in country**
  - Supply chain constraints: many countries cannot roll-out vaccines at the frontlines if they require a cold-chain
  - Personnel constraints: technologies for which skilled personnel such as doctors are required for administration may not be suitable in countries with low medical provider availability. Allowing non-medical staff to administer is a major policy decision. E.g. when non-medical staff could administer injectable contraceptives in Ethiopia and Bangladesh, uptake increased rapidly
  - Availability of delivery platforms: door-to-door delivery is expensive. Most countries look to integrate new product/service within existing platforms for service delivery. Workload or logistics issues may derail promising new interventions or slow down their adoption

Technology developers and funders should direct their efforts to focused groups of carefully chosen LMICs

SOURCE: Alstonia Impact analysis

The process from availability of a technology to roll out in public programs in LMICs is a long and complex one which requires careful navigation



SOURCE: Alstonia Impact analysis

To navigate the complex process, successful scale ups required collaboration among various players who play unique roles in the ecosystem

Philanthropists, bilaterals and multilaterals	▪ **Philanthropic funders** such as BMGF and CIFF and **bilateral aid agencies** such as that of UK, Canada, Japan funded technology development and commercialization, supported evidence gathering efforts, adaptation to LMIC context and launch of products in LMICs including demand generation. They also provided volume guarantees and supported pooled procurement efforts via organizations such as the Global Fund. Also supported low-cost manufacturers ▪ World Bank, AfDB, ADB and IAB provided **concessional capital** to governments once technology was proven and government decided to scale up ▪ **Innovative financing** structures played a minor role in the past but could become more relevant in the future. Examples are carbon credits, tax & incentive schemes to foster the private sector, tailored micro-credit solutions, etc.
Technology developers/ innovators	▪ **Large rich-world companies were usually developers of the technology**. E.g. BASF, Sumitomo for bed nets; Merck, GSK for MDA and Rotavirus/HPV vaccines, Pfizer for injectable contraceptives. Deep pockets to withstand long diffusion cycles could be potential reason for this (exception: cookstoves where local manufacturers were innovators). Occasionally, NGOs were also innovators of the technologies. E.g. PATH developed Injectable contraceptives delivery technology and licenses it to a major player (BD) for roll out (now for-profit start-ups also becoming relevant) ▪ Capacity of innovators in large LMICs increasing. In the future **innovations for LMICs by LMICs will become common**
Low-cost manufacturers	▪ In most examples, **presence of low-cost manufacturing facilities** in LMICs was critical to scale up there. E.g., India's Serum Institute of India makes Rotavirus vaccine and is working on an HPV vaccine. Chinese manufacturers and India make insecticide treated bed nets and are pre-qualified by vendors. Generic medicines from India and China play a big role in LMICs. Many of the clean cooking stoves are from LMICs e.g. Grameen Greenway
Key Gatekeepers	▪ For most technologies, a **formal endorsement from the WHO was a requirement** for scale up in the public system, but not a sufficient condition. They also play a role in **pre-qualification of suppliers** which allows pooled procurers to procure. Other gatekeepers can be local authorities (e.g. NAFDAC in Nigeria, CDSCO in India), which can require evidence collected locally, and local community leaders, which can help the receivers to accept the new technology. Large scale procurers such as GAVI, Global Fund, UNICEF and UNFPA also play gatekeeping roles
Non-profits and select UN bodies	▪ **NGOs usually help** test the technology in LMICs, clarify regulatory pathways, help advocate with governments and funders. Some NGOs such as PATH, FHI, and Population Council even work on development of technologies in-house ▪ Some such as GAVI (vaccines), Global Fund (Malaria commodities among others), UNFPA (contraceptives), UNICEF (vaccines) also work to **consolidate demand and pool procurement leading to lower costs**
Alliances	▪ **Issue-based alliances/umbrella bodies** such as the Rollback Malaria Initiative, Innovative Vector Control Consortium, Rota Council, Clean Cooking Alliance and HPV vaccination alliance **foster collaborations** between non-profits, governments, and businesses. In nearly all the areas studied, a key body coordinated activities and pushed the field forward. The alliance coalesced behind the technology as a solution to their issue area

SOURCE: Alstonia Impact analysis

Agenda

- Key insights from case studies
- **Deep dives on selected technologies**
  - Insecticide-treated bed nets
  - MDA against Lymphatic Filariasis (LF)
  - Mass de-worming
  - Injectable contraceptives
  - Rotavirus vaccine
  - Clean cooking stoves
  - HPV vaccine
- About Alstonia Impact & Authors
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7 preventative health technologies were selected to cover various health areas for deeper exploration (1/2)

Health area	Technologies / Solutions	Global or LMIC scale	Summary of key considerations
Vector borne diseases	1 Insecticide-treated bed nets for prevention of Malaria	▪ >2 billion distributed nets as of 2020	▪ Bed nets were mostly distributed for free (funded by international donors such us Global Fund, USAID, etc.), leveraging continuously existing channels when possible (e.g. Polio vaccine centers, pre-natal screening centers, etc.) ▪ Dedicated efforts were needed to raise awareness and to teach how to use the nets properly (e.g. local meetings, communication campaigns, etc.)
	2 Mass Drug Administration against Lymphatic Filariasis (LF) (parasite worms transmitted through bites of mosquitos)	▪ ~8 billion treatments to >900 million people as of 2019	▪ Distribution used a mix of door-to-door and static points of distribution, according to local needs. Communities were visited several times before drugs distribution to inform them and to explain them how to be ready (e.g. being at home at a certain time, eating before taking the drug, etc.) ▪ Drugs were mainly funded by local governments and through grants (WHO, Global Fund or other donors), given away for free to the population ▪ It was possible to reach high levels of distribution (WHO's goal >70%), finally eradicating LF (e.g. in Togo and Egypt)
Nutrition	3 Mass deworming to prevent developmental problems	▪ ~600 million children as of 2017	▪ Distribution leveraged existing capillary networks (e.g. vaccination facilities, schools) ▪ The initiative was funded with a significant contribution from the private sector through drugs donations ▪ Local activists engaged local communities to increase awareness
Reproductive Health	4 Injectable contraceptives to prevent unplanned pregnancies	▪ 74 million women as of 2019	▪ Distribution was mainly through community centers, operated by non-medical but trained staff. Door-to-door delivery was used at the beginning of the program to ramp-up usage. The same people were trained to counsel and to advice the women as well ▪ Most contraceptives came from the public sector or donors, but a significant share remained for those who preferred confidentiality and preferred to purchase from a Pharmacy. Tax cuts and financial benefits were designed for those cases

Note: the selection of technologies was made to have a diverse mix of health areas, different technologies, and having scaled up in LMICs
SOURCE: deep dives on the following pages

7 preventative health technologies were selected to cover various health areas for deeper exploration (2/2)

Health area	Technologies / Solutions	Global or LMIC scale	Summary of key considerations
Water and sanitation	5 Rotavirus vaccine against severe diarrheal disease in children	▪ 28% of children younger than 5 years as of 2016 (~185 million)	▪ The vaccine was added to national vaccination programs and distributed through the existing channels ▪ It was mainly funded by local governments, with support from GAVI if eligible ▪ Affordability has been a key enabler, mainly driven by pooled procurement (PAHO in Latin America) or low-cost production (India)
Respiratory health	6 Clean cooking stoves to prevent indoor air pollution and deforestation	▪ 75 million households in India alone as of 2020	▪ A Market-driven approach was used, leveraging local NGOs to promote and to sell the products, supported by a microcredit financing scheme supported by the local government, in addition to subsides to bio-gas plants and tax cuts for liquified petroleum gas stoves imports ▪ Village influencers and early adopters helped spread the message about benefits of the improved cookstoves
Non-communi-cable diseases (NCDs)	7 HPV Vaccine to prevent cervical cancer	▪ >270 million doses of vaccine given worldwide as of 2020	▪ Distribution was through schools and vaccine centers (changed according to the objectives of the different countries at different times) ▪ Funding came mainly from local governments plus through donations of drugs from manufacturers, pooling of procurement helped to decrease purchase price (e.g. PAHO in Latin America) ▪ Broad engagement and support of different local institutions and stakeholders was the key to ensure smooth distribution and necessary financial support (e.g. ministry of health, ministry of education, ministry of family, Cancer research institutions, health workers, …)

Note: the selection of technologies was made to have a diverse mix of health areas, different technologies, and having scaled up in LMICs
SOURCE: deep dives on the following pages

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1 Insecticide-treated bed nets (ITN) and Long-Lasting Insecticidal Nets (LLINs) are globally accepted as a primary Malaria prevention tool; over 2 billion nets distributed since 2004

Problem, solution, and key players

Problem

- Malaria is caused by parasites transmitted by infected Anopheles mosquitoes. In 2020, there were an estimated 241 million cases and 627,000 deaths globally. In 2020, the African Region accounted for 95% of cases and 96% of deaths [↗]

Solution

- The use of ITNs has shown reduction of malaria illness in endemic regions and is one of the two primary prevention tools. In African settings, ITNs were shown to reduce deaths by 20%. Cost per DALY of conventional ITNs is 5.90 USD and LLINs is 16.8 USD (2012 estimate) [↗]. Average cost per net is ~2 USD as of 2020 for UNICEF procurement [↗]; distribution of ITNs/LLINs is often financially supported from grants and they are given for free to the population. Major support for distribution comes from local volunteers and community workers who help in the implementation of programs

Key players (examples) and their roles

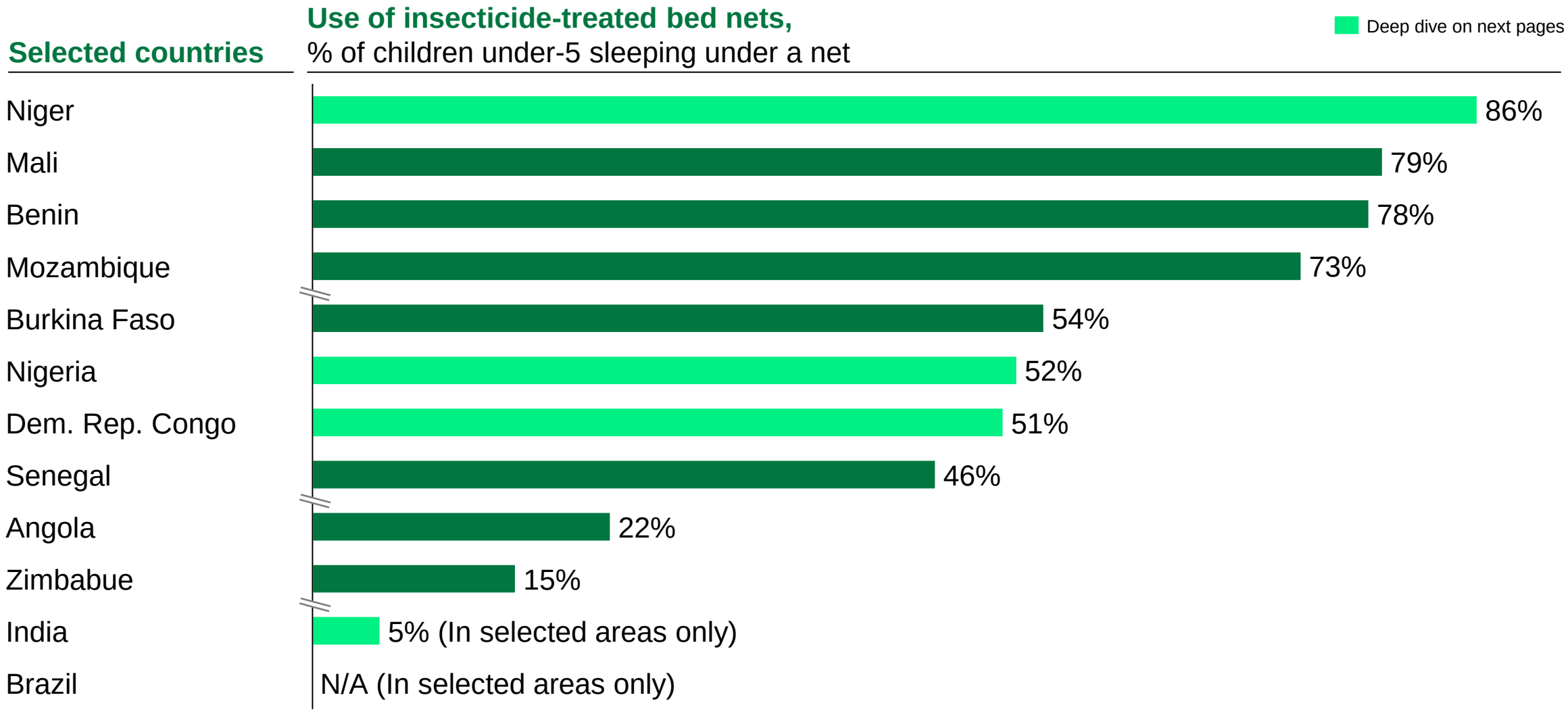
- **Tech providers:** Sumitomo Chemicals manufactured the first long lasting ITNs reco-mmended by WHO (2001). Other manufacturers are BASF, Vestergaard, Fujian Yameri
- **Gatekeepers:** Donors/funders procure only WHO-prequalified ITNs/LLINs, country government regulatory authorities also regulate ITN manufacturing & sale
- **Innovative Financing/Pooled procurement:** The Global Fund uses the pooled procurement mechanism. UNICEF procures LLINs on behalf of countries and partners either with using program funds or available country financing. MedAccess/BMGF worked with BASF to structure a volume guarantee to reduce pricing for BASF's next generation LLINs
- **Philanthropic funders**: Global Fund (see above), US President's Malaria Initiative (PMI), GiveWell, BMGF, Unitaid, FCDO, Canada
- **Concessional capital:** World Bank, African Development Bank
- **Alliances**: Action under the Roll Back Malaria Initiative is directed by national authorities backed by global partnership which include development agencies, banks, private sector groups, and researchers. Innovative Vector Control Consortium (IVCC) partners with non-profits and industry
- **Non-profits**: Against Malaria Foundation, Red Cross
- **Private sector customers**: 99% of demand from public sector programs in endemic countries. ExxonMobil distributes ITNs to protect workers and communities neighboring its pipeline. Tengke Fungurume Mining in DRC also distributes nets

Journey to scale

1984	First successful evaluation of ITNs against malaria was published
1998	WHO, the World Bank, UNICEF, and UNDP founded the Roll Back Malaria Initiative. It was the largest global action comprising of 500 partners. Roll Back Malaria recommended ITNs as one of the main malaria control tools [↗]
2002	The Global Fund to fight Aids, Tuberculosis and Malaria was established
2007	WHO recommended ITNs be long-lasting, and distributed either free or subsidized for full coverage of people at risk (shift from focus on pregnant women & children under 5) [↗]
2014-19	UNICEF price transparency efforts caused a reduction in prices from 5 USD in 2014 to under 2 USD per LLIN in 2019
2020	2.3 billion ITNs supplied globally (since 2004), of which 2 billion were supplied to sub-Saharan Africa

SOURCE: WHO [↗], CDC [↗], The Global Fund [↗], Global Giving [↗], ExxonMobil [↗]

1 Usage of mosquito nets is very high in heavily malaria affected areas, but there is very high variability



SOURCE: African countries data from 2021: [↗]; India (data from 2016) [↗], Article about Brazil from 2019 [↗]

1 Key considerations from selected countries which rolled out insecticide-treated bed nets (1/2)

Country (rational for selection)	Key considerations
Niger (low income country, high scale)	▪ In November 2005 – March 2006, the Ministry of Health of Niger and its international partners (mainly the Global Fund) organized an integrated campaign that provided free Long-Lasting Insecticidal Nets (LLIN) in conjunction with polio vaccinations and vitamin A distribution. Geographical coverage was incremental, leaving the capital city Niamey as last, so that distribution approach could be improved over time. Mothers or care takers were given a voucher to collect the bed net at a distribution center, or they were directly given by mobile distribution teams [↗] ▪ Following the campaign (April – June 2006), Red Cross volunteers implemented a “Hang-Up Campaign”, holding meetings in their own villages to demonstrate ITN hanging and discuss the importance of correct use ▪ Purchase and distribution of bed nets was financed mainly by the Global Fund and, from 2017, from PMI as well [↗] ▪ Usage rates were kept high thanks to rolling mass campaigns conducted every three years and reinforced through routine distribution channels — i.e. at the first antenatal care visit to pregnant women, and during the first vaccination of the new-born [↗]
Nigeria (lower middle income country, medium scale)	▪ Nigeria’s National Malaria Elimination Plan (NESP) aimed to increase ITN coverage and raise awareness to increase ITN use ▪ NMEP employed a mixed-model approach for ITN distribution (free mass distribution + continuous distribution). Continuous distribution relied on several health service delivery channels and commercial distribution ▪ To complement the ITN distribution efforts, Nigeria employed advocacy communication and social mobilization to improve knowledge, create demand, and increase use of ITNs. Messages were delivered at Antenatal Care (ANC) sessions and via radio advertisements ▪ Nigeria received ITN funding from the Global Fund ▪ The National Agency for Food and Drugs Administration and Control (NAFDAC) monitored and regulated the manufacturing, imports, and sales of ITNs. All WHO pre-qualified ITNs were endorsed for use by the Federal Ministry of Health (FMoH) and were registered with NAFDAC & Standard Organization of Nigeria (SON) [↗]

SOURCE: NVBDCP [↗], AMP [↗], Academia [↗], ReliefWed [↗], BMC [↗]

1 Key considerations from selected countries which rolled out insecticide-treated bed nets (2/2)

Country (rational for selection)	Key considerations
Democratic Republic of Congo (low income country, medium scale)	▪ DRC distributed almost 40 million ITNs & LLINs in 2021 from multiple funding partners (Global Fund, PMI, AMF, DFID/FCDO, UNICEF) ▪ The ITN/LLIN campaign was a series of mass distributions and replacements at the province level coordinated by the National Malaria Control Program ▪ Tengke Fungurume Mining was a major partner in the Gungurume health zone. The company's efforts, including distribution of ITNs, reduced malaria incidence by 60%
Brazil (upper middle income country, scale in limited areas only)	▪ Brazil's vector control program included distribution and installation of LLINs in the residences for free ▪ In 2007, Brazil received a 17 million Euro grant from the Global Fund [↗]. The grant aimed to carry out faster diagnosis, early and effective treatment, and distribution of LLINs in 47 Amazon towns where transmission was highest ▪ The use of LLINs has been officially adopted since 2011 the Project on Expansion of Access to Malaria Prevention and Control Measures, subsidized by the Global Fund. 1.1 million LLINs were installed as part of the program
India (lower middle income country, scale in limited endemic areas only)	▪ India's National malaria Control Program was launched in 1953 with a focus on indoor residual spraying ▪ The use of ITNs was included in the program policy under the Malaria Control Project from 1997. The project was partially financed by World Bank's IDA Credit. The type of bed nets distributed depends on the brands registered in India and the supply situation ▪ In 2009, the government adopted LLINs [↗] ▪ India was a strategic partner of the Global Fund, both as a grant implementer and as a donor [↗] ▪ The government planned to increase LLIN distribution through the private sector by creating an environment necessary for long-term sustenance of the private sector

SOURCE: NVBDCP [↗], AMP [↗], Academia [↗], ReliefWed [↗], BMC [↗]

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2 A global campaign coordinated by the WHO and with participation by large-pharma players led MDA against Lymphatic Filariasis (LF) to scale to > 8 billion treatments

Problem, solution, and key players

Problem

- Lymphatic filariasis (LF) is caused by parasite worms and transmitted through the bites of infected mosquitos. As of 2021, LF affects nearly 1 billion people in 49 countries throughout Asia, Africa, the Western Pacific, the Caribbean, and South America

Solution

- Mass Drug Administration (MDA) - two-drug regimen administered annually for at least five years, or three-drug regimen administered annually for at least two years in endemic areas – drugs used were well-established. Estimated cost per DALY between 4.40 to 8.10 USD. The drugs are usually distributed by community health workers, community representatives, or volunteers

Key players (examples) and their roles

- **Tech Providers:** Merck, Eisai, GSK and MSD (via Mectizan Donation Program) are pharma companies that donate large volumes of drugs
- **Gatekeepers/Alliances:** WHO coordinates global efforts, establishes guidelines, Global Program to Eliminate Lymphatic Filariasis (GPELF) was launched by WHO
- **Philanthropic Funders**: BMGF, the Arab Fund for Economic and Social Development, international development agencies of Japan and the UK have funded NGOs that support governments in planning and execution of campaigns, as well as supply chain costs. Private sector funded 53% of MDA programs (mainly through drug donations) in Burkina Faso, Dominican Republic, Egypt, Philippines, and Tanzania.
- **Concessional capital:** World Bank – recent funding in the Sahel region
- **Non-profits**: Children Without Worms, the International Trachoma Initiative, RTI International
- **Private sector:** DHL and others provide subsidized supply chain offerings

Journey to scale

1951 Supatonin, the diethylcarbamazine (DEC) drug, was used as a treatment for LF received regulatory approval in Japan. DEC was widely used in LF elimination programs since 1958. By 1970s, Japan became the first country to eliminate LF

1997 Resolution WHA 50.29 of the World Health Assembly set the year 2020 as the target for LF elimination as a global public health problem

2000 Global Program to Eliminate Lymphatic Filariasis (GPELF) was launched in 2000 by the WHO. Estimated 5 million disability-adjusted life-years (DALYs) and annual economic loss of 5.7 billion USD per year, 81 endemic countries

2013 Eisai began providing DEC to WHO free of charge. Committed to produce 2.2 billion tablets until 2020

2016 LF was considered responsible for at least 1.3 million DALYs

2019 By 2019, 8.2 billion treatments were delivered to more than 923 million people at least once in 68 countries, considerably reducing transmission in many places [↗]

SOURCE: WHO (linked in text), Exemplars in Health [↗], NIH [↗], Paper on pharma donations [↗], ATM [↗], PLOS [↗]

2 MDA against Lymphatic Filariasis (LF): Selected country status and experience

Country status with details for selected countries

Country (rational for selection)	Key considerations
Togo (low income country, early adopter)	▪ In 1998, Togo started national mapping to assess countrywide infection of Lymphatic Filariasis following the 1997 World Health Assembly call to eliminate the disease. Shortly after the mapping, the National Program to Eliminate Lymphatic Filariasis (NPELF) was launched ▪ Endemic parts of the country were identified, local community workers were tasked to go door-to-door to count the population (covering about 300 inhabitants each), identifying the target group (everyone except children below 5 years and sick people). Then requirements were shared with drug producers and, when received, they were handed over to households door-to-door. Delivery happened almost at the same time for all endemic areas ▪ Despite being underfunded, Togo was able to carry out the NPELF through the financial and technical support of Health & Development International (HDI), a Norwegian NGO. The HDI support attracted external partners such as the CDC. In addition to HDI funding, the program was also awarded the DFID grant through the WHO and the Global Fund ▪ By 2004, Togo's reported drug coverage in each district exceeded 80% of total population (vs WHO's goal of 70% coverage). Togo became the first sub-Saharan country to eliminate LF and move to MDA surveillance phase
Egypt (lower middle income country, exemplar)	▪ Egypt's struggle to overcome LF was one of the oldest in the history of public health. In 2000, it was one of the first countries to implement a national elimination program based on MDA ▪ Several rounds of MDA were implemented until 2013 when infection has been reduced below transmission levels. MDA surveillance was conducted for four years (2014 to 2017) to confirm that Egypt met all criteria for achieving elimination ▪ Egypt **provided 75% of the cost** of the program. The other costs were covered by program partners mainly through drug donation (GSK & WHO) ▪ The Ministry of Information supported the campaign by broadcasting materials in various media at national level. The Ministry of Religion acted as a steering committee which liaises with local community leaders to enlist their cooperation
India (lower middle income country, scale)	▪ The Elimination of LF (ELF) program was established in 2004 covering 202 districts. India exceeded WHO's target (at 72%) on the first year of the program ▪ ELF program was subsequently expanded to include all the 257 endemic districts targeting a population of about 650 million ▪ By 2019, India reached 87% national coverage, but elimination of the disease is not yet achieved. MDA was still carried out in 151 districts ▪ The policy decision to implement global strategy of co-administration of DEC with Albendazole was approved by the National Task Force on ELF chaired by the Directorate General of Health Services ▪ Details of the distribution were delegated to individual regions, which could adapt them according to local needs, e.g. producing informative material in local languages, using a mix of door-to-door and static points of distribution ▪ India partnered with WHO, BMGF, Clinton Health Access Initiative, and PATH in its MDA programs. The country received drug donations from pharma donors such as GSK & Merck. NGOs like Rotary International, Lions Clubs, and Lepra help supply manpower needs (in addition to government staff and community health workers)

SOURCE: PLOS [↗], NCVBDCP [↗], NCBI [↗], WHO [↗], Exemplars [↗]

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3 Mass deworming offers low-cost intervention against parasitic infection; it reached >598 million children

Problem, solution, and key players

Problem

- Globally, in 2010, an estimated 5.3 billion people, including 1 billion school-age children, lived in areas stable for transmission of at least one soil-transmitted helminth (STH) species (roundworm, hookworm, and whipworm), resulting in stunting and other developmental problems

Solution

- Periodic prophylactic administration of antiparasitic agents against soil-transmitted helminths is recommended by the WHO to control parasitic infections and disease burden. Mass deworming programs provided low-cost intervention against STH infection. Cost per DALY is estimated at 28.2-70.5 USD/DALY (schistosomiasis treatment) and 82.5 USD/DALY (STH treatment) in 2011* [↗]. School-based mass treatment costs approx. 0.30 USD per child per treatment. [↗] National government and health ministries implement the mass deworming program

Key players (examples) and their roles

- **Tech providers:** J&J and GSK are major developers of the STH drugs (there are also over 100 generic manufacturers)
- **Gatekeepers:** WHO provides technical guidance, prequalifies products
- **Innovative Financing:** The Deworming Innovation Fund will mobilize private capital (mainly donations from pharma companies) and coordinate with governments and private sector partners to create a robust delivery system.
- **Philanthropic Funders:** BMGF, GiveWell, END fund, pharmaceutical companies and other private donors donate medicines to support mass deworming programs globally
- **Concessional capital**: World Bank
- **Non-profits**: SCI Foundation, Evidence Action, Sightsavers
- **Private sector:** Private (& public) educational institutions facilitate mass deworming programs in schools

Journey to scale

1974
- US FDA approved mebendazole chewable tablets for oral use. Mebendazole is seen as a more efficacious and safe medicine to control STH. By 1980s, mebendazole became widely available

1993
- World Bank ranked the control of morbidity attributable to STH (through deworming) as the most cost-effective intervention for school-age children

2014
- The value for money of mass deworming for low-income countries has recently been enhanced by the availability of donated treatments. The “Deworm the World” initiative by Evidence Action rated as a top charity by GiveWell, resulting in increased funding

2017
- WHO issued first guideline confirming that deworming improves the health and nutrient uptake of heavily infected children. (it had promoted deworming for a long time prior to the guideline) [↗]
- Deworming programs reached more than 598 million children of preschool and school age, corresponding to almost 70% of those living in areas where STH infections are endemic

2020
- The END Fund announced its “Audacious” project – the Deworming Innovation Fund – in four strategic countries: Ethiopia, Kenya, Rwanda, and Zimbabwe

SOURCE: NCBI [↗] Lancet [↗], WHO [↗] FDA [↗]

*“Attempts to estimate the cost-effectiveness of deworming within the disability-adjusted life-year (DALY) framework have been problematic. In 2011, GiveWell found the figures published by the World Health Organization to be off by ~100x due to errors and flawed in other ways even once corrected.”

3 Mass deworming experience in Mexico and India

Country status with details for selected countries

Country (rational for selection)	Key considerations
Mexico (upper middle income country, early adopter and exemplar country)	▪ Mexico established national health weeks (NHW) in the early 1980s. Mass deworming was added to the NHWs in 1993. Mexico's nationwide deworming program has been among the longest running in the world and its coverage has reached 400 million children ▪ The NHWs were initially established and organized by the National Vaccination Council (CONAVA). The "Instituto Nacional de Diagnostico y Referencia Epidemiologicos" (INDRE) coordinated and evaluated the deworming component of NHWs. No additional testing of the drug was done. The quality was ensured by the manufacturing facilities ▪ In addition to the Ministry of Health, several other government agencies participated in administering the deworming component. ▪ By 2000, Mexico became the first country to have reached the 75% national coverage set by WHO
India (lower middle income country, scale)	▪ In 2015, The Ministry of Health and Family Welfare implemented the National Deworming Day, the world's largest deworming program. ▪ India dewormed 89 million schoolchildren during the Annual School Deworming Day in 2015. It is the largest public health intervention ever conducted in a single day. The program was scaled up to deworm 250 million children twice a year ▪ The Deworm the World Initiative, a coalition of organizations led by the non-governmental organization Evidence Action, was providing technical assistance to this national program ▪ The deworming program was **government-led and funded**. The government provided 36 million USD budget for Albendazole tablets in 2017-18 ▪ India has constantly scaled its deworming program, but national coverage (45%) still fell short of the WHO target ▪ The role of awareness generation and community mobilization was recognized by the program. State governments disseminated contextualized versions of the communication materials through various media. Community health volunteers (ASHAs) conducted village meetings with parents

SOURCE: Researchgate [↗] WHO [↗] CIFF [↗] NHM [↗]

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4 As of 2019, 74 million women rely on Injectable contraceptives (DMPA type), 27 years after FDA approval (from 1992 to 2019)

Problem, solution, and key players

Problem

- Unplanned pregnancies (49% of all pregnancies in LMICs) lead to high maternal, child mortality and a host of other poor societal outcomes

Solution

- Injectable contraceptives provide protection from unplanned pregnancies for 1-3 months. Pfizer's Depot MedroxyProgesterone Acetate (DMPA) is one of the key contraceptives: traditional injection is intra-muscular (IM) given by healthcare provider, innovation is a sub-cutaneous (SC) injection which is a self-injectable. Public or private sector doctors/nurses/lay workers provide injections in LMICs

Key players (examples) and their roles

- **Tech providers:** Pfizer and other manufacturers
- **Gatekeepers:** National drug authorities approve use considering local studies or rely on SRA (stringent regulatory authorities such as FDA). WHO assesses evidence and provides guidelines on suitability of contraceptive use. Local medical associations (e.g. Federation of Obstetric and Gynecological Societies of India)
- **Innovative financing/pooled procurement :** UNFPA pools demand and procures on behalf of several countries (esp. LICs)
- **Philanthropic Funders:** BMGF, USAID, CIFF, Packard Foundation and others fund NGOs that support a) research b) pilots and local evidence generation c) planning and execution of launch campaigns, as well as some supply chain costs
- **Alliances:** Reproductive Health Supplies Coalition is a partnership of public, private, and NGOs focused on access to supplies for low- and middle-income countries. DMPA-SC Access Collaborative (led by PATH in partnership with JSI) work with ministries of health and partners across public and private sectors to facilitate scale-up of the DMPA-SC
- **Non-profits:** International Planned Parenthood Federation (IPPF) Population Council, Concept Foundation, Marie Stopes International, PATH, FHI360, etc. Support governments, generate evidence or run clinics, some like PATH/Population Council/FHI360 support in R&D
- **Private sector:** Private retail pharmacies facilitate distribution. Insurance companies cover costs in some countries. Private individuals pay directly if accessing through private channels. In 2016, more than 106 million women in the world's 69 poorest countries relied on the private sector for their modern method of contraception (including injectables) (source)

Journey to scale

1992
- Approval from FDA for use of DMPA as contraceptive

1993
- India: DMPA approved by the Drug Controller General of India (DCGI) in June 1993 for marketing and use as an injectable contraceptive method. After several court cases, inclusion in the national family planning program for (free) distribution through public health sector was not allowed

2000s
- Gradual roll-out in LMICs with IM variant; more popular in sub-Saharan Africa than in other regions
- India: Clinical trials and acceptability studies conducted by the Indian Council of Medical Research (ICMR) and Population Council

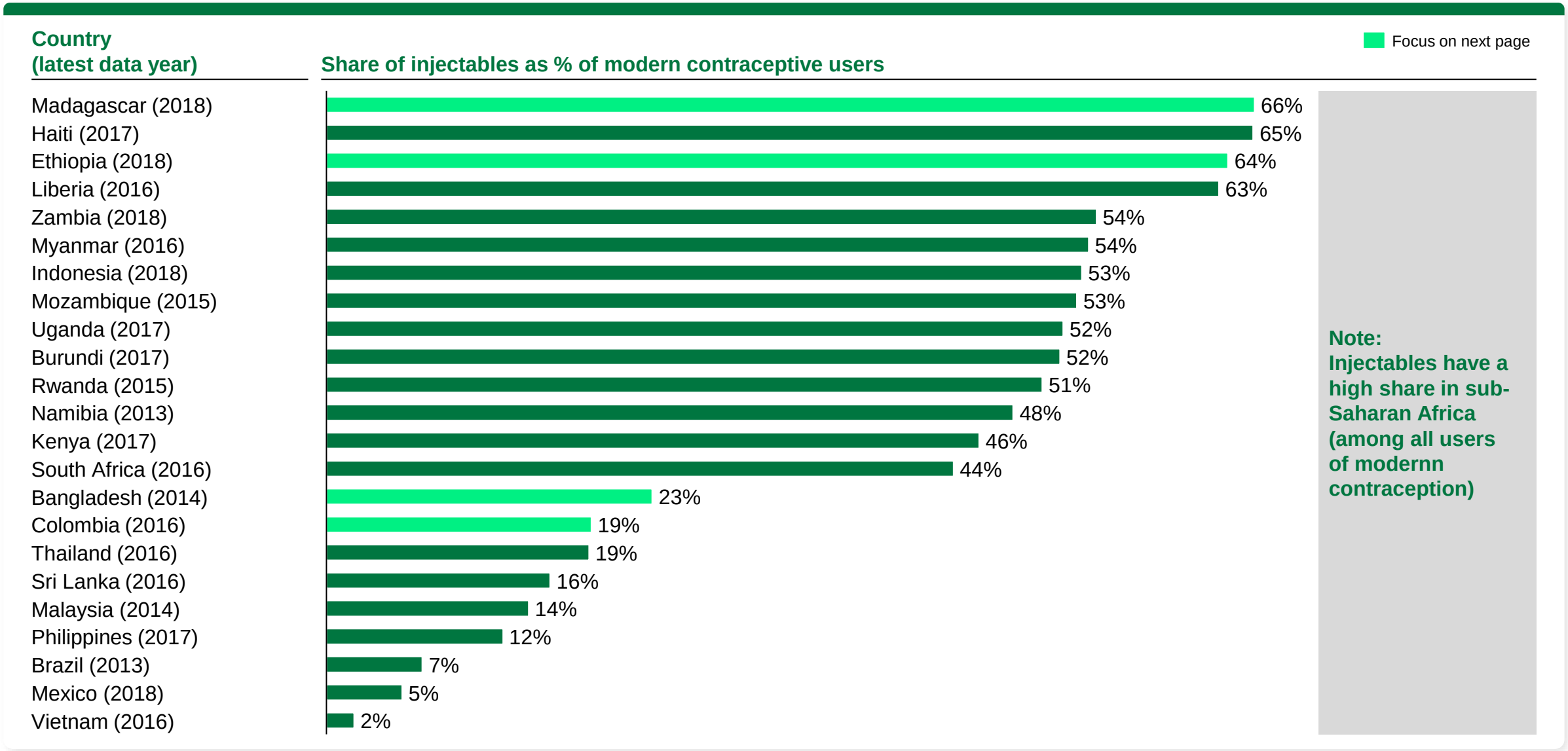
2014-16
- 2014 onwards: MoHs of Burkina Faso, Niger, Senegal and Uganda pilot self-injection
- 2015: WHO Statement on DMPA – reiterated earlier statement on safety
- WHO recommended use of DMPA even in high HIV settings; launched in public program in India

2017
- India: DMPA finally launched in 2017 in the public program

2019
- 74 million women globally rely on injectables for contraception (8% share among users of modern/traditional methods)

SOURCE: WHO [↗], CDC [↗], The Global Fund [↗], Global Giving [↗], ExxonMobil [↗]

4 Share of injectables as % of all modern contraceptive users varies significantly by country



SOURCE: United Nations, Department of Economic and Social Affairs, Population Division (2020). World Contraceptive Use 2020 (POP/DB/CP/Rev2020).

4 Injectable contraceptives experience in selected countries (1/2)

Country (rational for selection)	Key considerations
Madagascar (low income country, exemplar)	▪ In 2006, Madagascar revised national guidelines for family planning to include injectable contraceptives. Prior to implementation, it conducted a pilot study to test feasibility of community-based distribution (CBD) of injectables by non-medically trained community workers. The study showed the CBD workers are competent in injection technique, counselling, and managing re-injection schedules ▪ The experience from Madagascar was among the first evidence from sub-Saharan Africa documenting the effectiveness of CBD services for injectable contraceptives. The CBD approach extended services to traditionally underserved remote areas ▪ In 2019, Madagascar integrated a tax exemption (remove 20% VAT) for contraceptives into the country's finance law ▪ International donors (USAID, UNFPA) and technical partners (PATH, JSI) provide over 95% of Madagascar's family planning commodities. The government made progress towards increasing domestic financing through the tax exemption passed in 2019 ▪ Ambassadors (ministry of health officials, university lecturers, pharmaceutical society executives) built a group of supporters within the Ministry of Health to expand availability of injectables at the community level
Bangladesh (low middle income country, early adopter)	▪ Introduced injectable contraceptives in the national family program in 1976. Currently, injectables is the second most used contraceptive method (23% share among users) in Bangladesh after oral pills– Injectable programs have also been in operation in many NGO areas and special projects ▪ The success of an experimental program in 1984 in which injectables were delivered in clients' homes by Family Welfare Assistance (FWAs) has led the Ministry of Health and Family Welfare (MoHFW) to expand the injectables coverage. The experiment proved the safety of this injectable delivery method ▪ Since late 1990s, the program shifted from door-to-door delivery to site-based service delivery to cut costs. The willingness of women to visit sites reflects in part the success of Bangladesh family planning program ▪ Before 1998, contraceptives were supplied by donors (DFID, CIDA, KfW, UNFPA, and USAID). Donors procured directly and shipped the injectables to Bangladesh. Procurement process changed when the World Bank, development partners, and the government of Bangladesh funded the sector wide approach program (SWAp). Under this, MoHFW must conduct the procurement on their own and it should be in accordance with IDA and World Bank requirements

SOURCE: BMC [↗], IAPHL [↗], ICDDRB [↗], NCBI [↗], PATH [↗], USAID [↗], SRHM [↗]

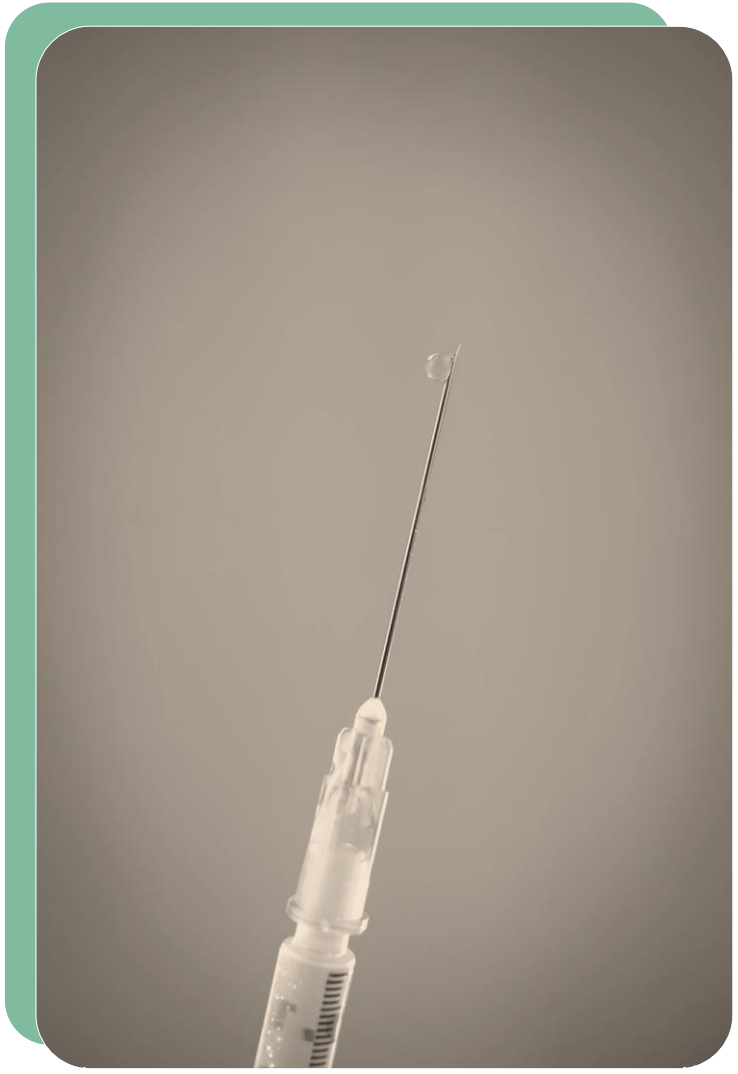
4 Injectable contraceptives experience in selected countries (2/2)

Country (rational for selection)	Key considerations
Ethiopia (low income country, scale)	▪ Injectable was the most popular contraceptive method used in Ethiopia (64% share among users of modern contraceptives in 2018) ▪ Starting in 2005, the government intensified its commitment to family planning, recognizing it as an essential health service ▪ The government of Ethiopia launched the Health Extension Program (HEW) in 2004. HEWs have at least tenth grade of education and receive 18 months of training. In 2007, the government allowed the HEWs to administer injectable contraceptives which likely contributed to doubling of injectable use from 2005 (~7%) to 2011 (14%). Following the increased demand in contraceptives, the Bixby Center and the Tigray Regional Health Bureau conducted a pilot study (2007 to 2009) to test if community-based health reproductive agents (CBHRA) could administer injectables with same safety and effectiveness as HEWs. [↗] This pilot study paved the way for scaling up community-based distribution of injectables ▪ NGOs and donors played a key role in scaling up family planning programs in Ethiopia. Pathfinder International and CORHA are active player in research and advocacy. Packard Foundation started funding FP programs in 1999. NGOs like DKT donate/cross subsidize contraceptives (27.5 million injectables in 2014)
Colombia (upper middle income country, limited diffusion)	▪ Colombia's most popular contraceptive method is female sterilization (48%) followed by injectables at 13% and pills at 10% [↗] ▪ The social health insurance scheme, both contributory and subsidized, cover a basic package of health services, including all major family planning methods, free of charge ▪ As of 2010, more than half of contraceptive users obtained their contraceptives from the public sector (56%), followed by pharmacies (23%) and the NGO Profamilia (16%). About 5% got contraceptives from other sources (private physician, supermarket, etc.) ▪ In early years (before 1990), USAID and IPFF provided the bulk of contraceptives used in FP programs. After the passage of health reform, both public and private health insurance purchased their own contraceptives, and citizens did not need to pay for them

SOURCE: USAID's Measure Evaluation [↗], FP2030 [↗], Princeton [↗], Berkeley [↗]

4 The subcutaneous injectable contraceptives delivery technology is promising and was developed by an NGO and licensed to a large private company (BD) to scale up

- Traditionally, drug was delivered through intramuscular injections (IM) → means dependance on healthcare practitioners who not always available/evenly distributed in LMICs
- A simpler technology was developed by PATH (International NGO) and others to deliver the drug subcutaneously (SC)
  - This offered possibility of self-injection (like diabetics do) or injection by lay community health workers
  - In many places, women wanted discretion from husbands or society, and this could help with that
- Path to roll-out and early scale
  - 2004: evidence first published, ~2019: WHO recommended use of SC variant for self-injection
  - This was then licensed to BD to create the Prefilled BD Uniject™ injection system, which was originally developed
  - The SC product is now available in at least 20 FP2020 countries and is approved by regulatory agencies in more than 40 countries worldwide, including in the European Union. It can be purchased at 0.85 USD per dose for qualified buyers—a price similar to DMPA-IM
- Key players and alliances
  - Funded by BMGF, CIFF, and others, SC seen as a promising area within family planning
  - Path, JSI others are key NGOs working via the DMPA-SC Access Collaborative
  - Pfizer markets SC variant as Sayana Press



SOURCE: PATH, link; WHO - link

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5 Six Rotavirus vaccine are approved and available for use; >100 countries introduced it into their national vaccination program

Problem, solution, and key players

Problem

- Rotaviruses are the most common cause of severe diarrheal disease in infants and children worldwide, predominantly in developing countries

Solution

- Rotavirus vaccines were developed to prevent rotavirus diseases. In 1998, RotaShield, the first Rotavirus vaccine, was licensed. Currently, there are four WHO prequalified Rotavirus vaccine and two nationally licensed. Cost per DALY of rotavirus vaccination ranges from 0.09 to 0.50 USD [↗]

Key players (examples) and their roles

- **Tech providers:** GSK, Merck, and other manufacturers. Building on research by academia
- **Gatekeepers**: National ministries of health generally manage the delivery of vaccine. Prior to roll-out, technical committees make recommendations for inclusion in national programs. WHO prequalifies the vaccine (allowing UNICEF and GAVI procurement) and provides technical guidance
- **Philanthropic Funders**: BMGF, CIFF and others have provided funding support to vaccine manufacturers and NGOs for research and roll-out
- **Innovative financing/pooled procurement:** GAVI provides subsidy for low-income countries (<1,630 USD per capita income) and is a key mechanism. Pan American Health Organization (PAHO) facilitated the vaccine procurement in Latin America. UNICEF is another key multilateral inst.
- **Non-profits:** PATH, JSI and others are NGOs that focus on vaccine delivery or research
- **Alliances**: Rota Council coordinates efforts among NGOs, funders, MoH
- **Private sector:** In several countries including LMICs, parents (generally affluent) pay for Rotavirus vaccines privately

Journey to scale

1998 — Approval of RotaShield, the first Rotavirus vaccine; withdrawn from market several months after introduction because of safety concerns

2007-09 — WHO recommended inclusion in all national programs (2007). By 2009, four vaccines were licensed (2nd generation vaccines): Lanzuo (approved in 2000, China license), Rotateq (Merck, approved in 2008, WHO prequalified), Rotavin (approved in 2008, Vietnam license), Rotarix (GSK, approved in 2009, WHO prequalified)

2016 — ~28% of children younger than 5 years were vaccinated (~185 millions) [↗]

2018 — Pre-qualification by WHO 2 further vaccines: Rotavac (Bharat Biotech) and RotaSiil (Serum Institute of India)

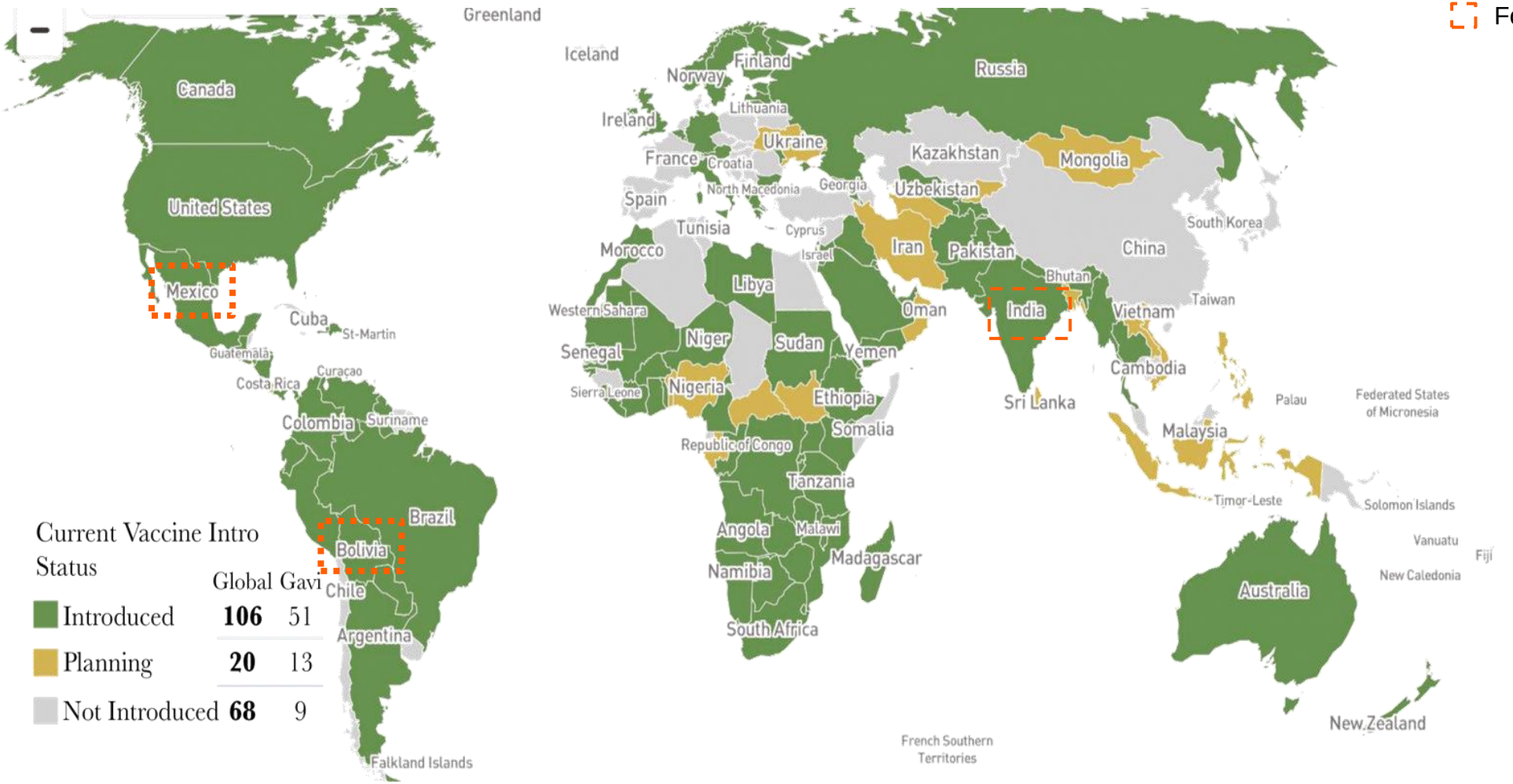
- Developed with a financial agreement between the Government of India, BMGF and PATH to ensure the availability at affordable prices for low-income countries.

2020 — Over 100 countries had introduced rotavirus vaccines into their national program. Introduction in middle-income countries has lagged behind high- and low- income countries because of vaccine cost. GAVI provides subsidy to low-income countries

SOURCE: WHO [↗], CDC [↗], Journal of Infectious Diseases [↗], GAVI [↗], NIH [↗], Lancet [↗]

5 As of today, several countries added rotavirus vaccine to their national recommendations

Country status with details for selected countries



SOURCE: Clinical Infectious Diseases [↗] The Journal of Infectious Diseases [↗] (Map from January 2020) BMC [↗]

5 Key considerations from selected countries about Rotavirus roll-out

Country status with details for selected countries

Country (rational for selection)	Key considerations
Bolivia (lower middle income country, early adopter & high coverage)	▪ In Latin America, where many clinical trials were conducted, a tiered price (90% lower than US) led to early adoption. This was facilitated by a strong recommendation from PAHO. Bolivia introduced Rotavirus vaccination in 2008 ▪ It was the first GAVI-eligible country to introduce the rotavirus vaccine. It also has the highest co-financing level among countries receiving GAVI support. The national government co-financed nearly half of the vaccine price ▪ The two major vaccine manufacturers tiered vaccine prices for the PAHO revolving fund for middle income countries and through GAVI for low income countries ▪ In 2016, vaccine coverage in Latin America ranged from 47% to 99%. Bolivia held the highest immunization rate ▪ Bolivia planned to wean out of GAVI support by 2015 but the program was extended to 2018. The WHO/UNICEF estimates of National Immunization Coverage in 2019 showed decline in coverage for countries that have transitioned from GAVI support (including Bolivia)
Mexico (upper middle income country, self-funded without GAVI support)	▪ Mexico was the first country globally to introduce rotavirus vaccine in its National Immunization Program (NIP) in 2007. All Mexicans are entitled to routine vaccines in the NIP in the public health center of their choice, free of charge ▪ The immunization program was funded by Federal & state government revenue and by employee/employer social security contributions ▪ Mexico's rotavirus vaccines were procured through PAHO ▪ By 2017, Mexico had 69% Rotavirus vaccine coverage
India (lower middle income country, scale, unique political considerations that led to delayed introduction)	▪ India committed to vaccinate every infant after domestic development of two newly licensed Rotavirus vaccines, which came at much lower costs compared to other options. India became the first country in Asia to introduce the Rotavirus vaccine in the Universal Immunization Program (UIP) in 2016. The decision did not only rest on the huge burden of the disease or the demonstrated efficacy of the vaccine but also on the domestic development of the vaccines, consistent with the country's move to make its own vaccines ▪ India introduced the vaccine in a phased manner, first covering 11 states till 2019 and then expanding nationwide ▪ The first two phases of the program were fully funded by the government of India with technical support from immunization partners (WHO, JSI, UNICEF, GHS, and PATH). The vaccine used for the third phase was procured with the support of GAVI. The implementation and roll out was funded by the national government

SOURCE: Clinical Infectious Disease [↗], The Journal of Infectious Diseases [↗], BMC [↗], GAVI [↗], NCBI [↗], ThinkWell [↗], PAHO [↗]

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6 World Bank's Efficient, Clean, Cooking and Heating Program (ECCHP) helped clean cooking solutions to reach >20 million people

Problem, solution, and key players

Problem

- The WHO estimates that 4.3 million people die each year from indoor air pollution produced by traditional cookstoves. Women and children are particularly at risk as they inhale most of the carbon monoxide. They also collect wood, charcoal, animal dung, or crop waste to fuel the cookstoves. Nearly 3 billion people do not have access to modern cooking services, i.e. use open fires and simple stoves

Solution

- Improving access to cleaner cookstoves (90% less carbon monoxide, 50% less biomass fuel) and/or clean fuels drastically reduces the health hazards of traditional polluting cookstoves. It also mitigates environmental impacts of deforestation and greenhouse gas emission. Average cost to improve cookstove is at 45 USD

Key players (examples) and their roles

- **Tech providers:** 5 Star Stoves, SSM Stoves, BURN, Bondhu Chula, Greenway and many other manufacturers. Global partners conduct research to improve technology. Clean cooking companies tracked by CCA raised 70 million USD from private sector investments in 2021
- **Gatekeepers:** Various government departments, facilitate testing to ensure quality. WHO has a limited role: publish WHO Guidelines for indoor air quality: household fuel combustion
- **Innovative Financing:** Several players testing subsidies from carbon credit generation; results-based financing. ; in some places, micro-credit is given to individuals to purchase their preferred stoves
- **Philanthropic Funders:** Norad, Global Affairs Canada, BMGF, Osprey Foundation, GIZ, SNV, Barr Foundation
- **Concessional capital:** The Energy Sector Management Assistance Program (ESMAP) has mobilized much of World Bank's lending portfolio. The Green Climate Fund and ADB facilitated additional funding for ECCHP. African Development Bank supports the Spark + Africa Fund
- **Alliance:** The Clean Cooking Alliance (CCA) is a non-profit operating with UN Foundation support. It works with a global network of partners to achieve universal access to clean cooking. It also funds research to evaluate the risks of traditional cooking
- **Non-profits:** Various NGOs organize promotional and educational campaigns, and may distribute stoves. E.g. SNV Netherlands [↗]
- **Private sector:** Commercially-available stoves are purchased and deployed [↗]

Journey to scale

Before 2010
- Various countries (e.g. Bangladesh [↗], Uganda) implemented programs to address polluting cookstove problem but with little success. These programs focused on increasing supply

2010
- Creation of Global Clean Cooking Alliance
- ESMAP completed study supporting a market-driven model for successful implementation of an improved cookstove program (Bangladesh case). This model aims to aid the growth of entrepreneurs and micro-enterprises across the value chain

2013
- Bangladesh launched Country Action Plan for Clean Cookstoves (largest clean cooking operations in the world)

2016
- Launch of Pradhan Mantri Ujjwala Yojana (PMUY) in India. PMUY had a goal of providing LPG 80 million below-poverty-line households by 2020 (India)

2019
- ECCHP launched the 500 million USD Clean Cooking Fund – first ever fund to scale up investments in the clean cooking sector

2020
- 380 million USD of World Bank financing mobilized across 24 countries (helped about 20 million people gain access to cleaner and more efficient cooking and heating solutions, target to reach 44 million)
- More than 75 million Indian households acquired an LPG stove (since 2015)

SOURCE: World Bank Asia [↗], Pacific Energy [↗], GIZ [↗], CCA [↗], Drawdown [↗], IOP Science [↗]

6 ECCHP's market-driven strategy focusing on value-chain integration and results-based financing filled gaps in clean cooking programs in Bangladesh

The journey in Bangladesh (lower middle income country)

- The government (in collaboration with global partners and donors) had been trying to address the problem since the 1970s but with little success. Only less than 5% of household had access to an improved cookstove in 2010
- In 2010, ESMAP completed a study recommending a market-driven model for Bangladesh' cookstove program. Following the recommendation, Bangladesh launched the Improved Cookstoves program tapping a network of NGOs and local influencers (with 20 million USD funding from World Bank) in 2013
- The CCA provided technical advice (stove technology and fuels, impact assessments, marketing strategies). The Bangladesh Atomic Energy Commission and the Bangladesh University of Engineering Technology acted as a hub for testing, ensuring the quality of the cookstoves
- By 2017, 1 million improved cookstoves were in use. World Bank helped secure additional funding from Green Climate Fund (20 million USD) which will help the program reach 4 million more households by December 2021
- Village influencers and early adopters helped spread the message about the fuel saving and health benefits of the improved cookstoves

Bangladesh government policies

- Suspended additional connection of LNG (Liquefied natural gas) to households because of depleting reserves and increase demand from the industrial sector, giving way to substitute technologies like LPG (Liquefied petroleum gas)
- NGOs that sell and promote the cookstoves were funded under a microcredit scheme by the Infrastructure Development Company Limited (IDCOL), a government-owned development-finance institution. The NGOs were funded around a results-based financing network where payout were tied to sales performance on a variable scale
- IDCOL provided subsidies to establish bio-gas plants around the country.
- Tax exemptions for LPG imports. Access to micro-credit and tax benefits for purchasing

Technology	Usage as of 2017-18, % of ~35 M households[1]	Target usage in 2030, % of ~50 M households[1]
LPG-based stoves	15%	60%
LNG-based stoves	10%	10%
Improved cookstoves	10%	40%
Electric stoves	1%	8%
Biomass-based stoves	74%	30%

1 Totals may not add up to 100% due to stove stacking i.e. households may use several options
SOURCE: Clean Cooking Org [↗], SEforALL [↗], Asia Pacific Energy [↗]

Agenda

- Key insights from case studies
- **Deep dives on selected technologies**
  - Insecticide-treated bed nets
  - MDA against Lymphatic Filariasis (LF)
  - Mass de-worming
  - Injectable contraceptives
  - Rotavirus vaccine
  - Clean cooking stoves
  - **HPV vaccine**
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7 Human Papillomavirus (HPV) vaccine made cervical cancer a preventable disease; > 270 million doses have been given worldwide

Problem, solution, and key players

Problem

- Cervical cancer is the second most common cancer in women and a leading cause of mortality worldwide. It is estimated that 311,000 people die from the disease each year, 91% of which live in LMICs where timely screening is rare

Solution

- With the advent of HPV vaccines, cervical cancer became a preventable disease. HPV vaccines reduce cervical cancer cases by nearly 90% [↗]. Prevention is best achieved through immunization of girls, prior to sexual debut. The mean predicted (incremental cost-effectiveness ratio) ICER of HPV vaccination for 195 countries is 4,217 USD/DALY in 2017. The ICER was below 800 USD/DALY for 64 countries (including countries eligible for subsidized vaccine from GAVI & PAHO) [↗]

Key players (examples) and their roles

- **Tech provider:** MSD, GSK, Innovax, Serum Institute of India
- **Gatekeepers:** Government health ministries and other agencies recommend and approve vaccine use and inclusion in immunization programs
- **Philanthropic Funders:** BMGF, USAID, PEPFAR, Unitaid
- **Innovative financing/pooled procurement:** GAVI provides subsidy to low-income countries. PAHO member countries pool resources and purchase vaccine at lower cost using the PAHO Revolving Fund.
- **Alliance:** HPV Vaccination Alliance, TogetHER [↗]
- **Non-profits:** PATH, IARC, PSI, AVAC, CHAI, National Cervical Cancer Coalition, Noman Campaign, etc.
- **Private sector:** Pharma companies (Merck, GSK) make vaccines, sometimes donate vaccine doses. Private insurance companies cover HPV vaccination [↗]. Private companies subsidize or offer for free HPV vaccines for its employees

Journey to scale

1991
- Completion of the first human trials for the vaccine Gardasil (by MSD) after seven years of design and testing

2006 to 07
- In 2006, Gardasil was approved for use by Australia and USA. By 2007, the vaccine was approved in 80 countries

2009
- WHO issued first position paper recommending use of HPV vaccine. Two vaccines (MSD's Gardasil & GSK's Cervarix) were widely marketed when this position paper was issued [↗]

2010 to 11
- In 2010, Bhutan became the first LMIC to introduce HPV vaccine. Rwanda was also an LMIC early adopter being the first African country to introduce the vaccine in 2011. Controversy around demonstration trial in India

2017
- By March 2017, 71 countries introduced HPV vaccine in their national immunization programs [↗]

2020
- More than 270 million doses of the HPV vaccine have been given worldwide [↗]. 55% of 194 WHO countries had introduced vaccine
- World Health Assembly adopted the Global Strategy for cervical cancer elimination. One of the three key pillars of the strategy is to fully vaccinate 90% of girls of age 9 to 14 by 2030
- Global Vaccine Summit 2020 – five manufacturers committed to increase supply of vaccine to GAVI-supported countries (target to reach 84 million girls)
- In India, introduction of vaccine in national program pending decision by its highest court. Some states have included it in their vaccination schedules

SOURCE: WHO [↗] GAVI [↗] NCBI [↗] History of HPV Vaccine [↗]

7 In Rwanda, Bhutan and Argentina different strategies were used to make the HPV vaccine available to those who needed it

Country (rational for selection)	Key considerations
Rwanda (low income country, early adopter, scale, exemplar)	▪ In 2009, Rwanda's first lady met with MSD officials on the topic of the HPV vaccine. By 2011, Rwanda became the first African country to implement a national HPV vaccination program [↗] ▪ Three decisions were crucial to Rwanda's successful vaccine roll out. (1) Widen technical working group to include the Ministry of Education, Ministry of Gender and Family Promotion, Center for Treatment and Research of AIDs, Tuberculosis, Malaria, and other Epidemics, and health workers engaged in cancer care. (2) Partner with Ministry of Education to design a school-based strategy for vaccine delivery (3) Adopt a multi-phase strategy spanning three years. ▪ After the initial school-grade-targeted catch-up campaign, Rwanda transitioned to a routine vaccination of 12 year-olds only [↗] ▪ A total of ~1.2 million girls received a first dose of the HPV vaccine between 2011 and 2018. This represents 98% coverage for eligible girls (12 years old) ▪ MSD donated over 1.3 million doses of Gardasil under a three-year comprehensive national cervical cancer prevention program (started in 2011). The program took place before the availability of GAVI funding for HPV vaccination. Since 2015, Rwanda has purchased HPV vaccine through GAVI support [↗]
Bhutan (lower middle income country, early adopter, exemplar)	▪ In 2010, MSD and Australian Cervical Cancer Foundation (ACCF) partnered with the Royal Government of Bhutan to establish the first national HPV vaccination in a LMIC. MSD donated Gardasil for the first year of the six-year of the program. ACCF provided financial support to the government of Bhutan to secure doses for the access price offered by MSD [↗] ▪ At the beginning of 2011, HPV vaccine was incorporated into the routine immunization of girls aged 12 years old and was delivered from health centers. In 2014, vaccination delivery was changed into a school-based program delivering it to girls in Class VI regardless of age ▪ In 2019, the Ministry of Health allocated 186 million USD for a flagship program that aims to reduce stomach and breast cancer and eliminate cervical cancer ▪ The Ministry of Health announced its intention to begin HPV vaccination for boys following the vaccine donation from MSD in 2020 [↗]
Argentina (upper middle income country, example of country who paid vaccine)	▪ The government of Argentina provided HPV vaccine to 11-year-old girls since 2011 [↗] ▪ Two organizations play a key role in Argentina's immunization program. (1) National Immunization Commission provides recommendation to the government regarding introduction of new vaccines (2) National Bureau of the Control for Immuno-preventable Diseases (NBCID) manages the dissemination of the vaccine after approval [↗] ▪ Before inclusion in the national vaccination schedule, HPV vaccine could only be obtained through the private health sector at 300 USD. Through PAHO's revolving fund [↗], Argentina was able to purchase the HPV vaccine at 14 USD. This prompted Argentina to add HPV vaccine in its immunization schedule ▪ Since 2003, there has been 1,700% increase in the budget for vaccinations within Argentina's Ministry of Health. This resulted in the increased capacity of the NBCID to store and distribute vaccines ▪ Argentina employed a mixed strategy for vaccine delivery (school-based and on demand in vaccination centers) [↗]

SOURCE: WHO [↗] GAVI [↗] NCBI [↗] History of HPV Vaccine [↗]

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Alstonia Impact in a nutshell

About Alstonia Impact

- Set-up in 2018, headquartered in New Delhi by professionals with previous donor-side experience
- Two verticals:
  1. Strategy consulting for philanthropists and impact investors, and their portfolio organizations
     - Example clients: BMGF, Omidyar Network
  2. Quantitative / Qualitative research and market advisory services
     - Example clients: One Acre Fund, BMGF, World Bank
- Lean core team with a network of global experts
- Strong public health practice with experience in TB, RMCNH, Nutrition, and NCDs

Our network

Our clients…

Bill & Melinda Gates foundation

UN

The World Bank

Wadhwani AI

unicef

CADASTA

… and where we come from

Bill & Melinda Gates foundation

McKinsey & Company

Oxford Policy Management

Johns Hopkins Bloomberg School of Public Health

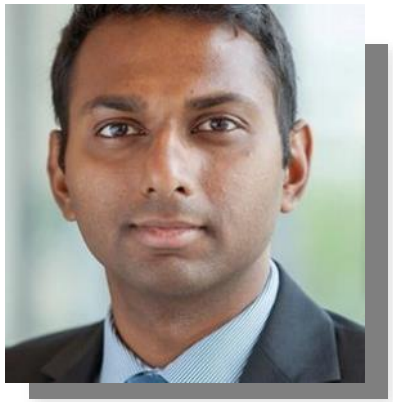
SIEMENS

sanofi

INSEAD The Business School for the World®

SOURCE: Alstonia Impact analysis

Authors



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Glossary (1/2)

BMGF: the Bill & Melinda Gates Foundation, an American private foundation [↗]

CIFF: the Children's Investment Fund Foundation, a British philanthropic organization [↗]

DALY: Disability-adjusted life year, additional year of life, free of disabilities, gained thanks to a specific technology / solution [↗]

DMPA: Depot MedroxyProgesterone Acetate, a type of injectable contraceptive

DMPA-IM: Depot MedroxyProgesterone Acetate- Intra-Muscular; this type of injection requires a health worker

DMPA-SC: Depot MedroxyProgesterone Acetate- Sub-Cutaneous; this type of injection can be performed alone, and it does not require a health worker

DPT: vaccine against Diphtheria, Pertussis and Tetanus toxoids

ECCHP: Efficient, Clean, Cooking and Heating Program, led by the World Bank [↗]

ESMAP: the Energy Sector Management Assistance Program, an initiative to achieve universal energy access by 2023 and to advance decarbonization [↗]

FDA: Food and Drug Administration, the Health Authority of the United States [↗]

HPV: Human Papillomavirus, a virus which can lead to cancers of the cervix, anus, and throat [↗]

ICER: Incremental Cost-Effectiveness Ratio is calculated by dividing the difference in total costs (incremental cost) by the difference in the chosen measure of health outcome or effect (incremental effect) to provide a ratio of ‘extra cost per extra unit of health’ effect [↗]

ITN: Insecticide-treated bed nets

LF: Lymphatic Filariasis, caused by parasite worms and transmitted through the bites of infected mosquitos

LLIN: Long-Lasting Insecticidal Nets

LMIC: Low-Medium Income Country, defined according to specific average-income thresholds from the World bank [↗] & [↗]

SOURCE: Alstonia Impact analysis

Glossary (2/2)

LNG:	Liquefied natural gas, mainly methane [↗]
LPG:	Liquefied petroleum gas, a mixture of propane and butane. Its calorific value per unit volume is about 2.5 times larger than that of natural gas (methane) [↗]
MDA:	Mass Drug Administration is the administration of a certain treatment to every member of a defined population or every person living in a defined geographical area (except those for whom the medicine in contraindicated) at approximately the same time and often at repeated intervals
MoH:	Ministry of Health
NCD:	Non-Communicable Disease, a group of conditions that are not mainly caused by an acute infection, but result in long-term health consequences and often create a need for long-term treatment and care. These conditions include cancers, cardiovascular disease, diabetes and chronic lung illnesses.
NGO:	Non-Government Organization
PAHO:	Pan American Health Organization, an international public health agency working to improve the health and living standards of the people of the Americas [↗]
PMI:	President's Malaria Initiative, the U.S. Government's focal point for the global fight against malaria [↗]
QALY:	Quality Adjusted Life Years, a generic measure of disease burden, including both the quality and the quantity of life lived [↗]
USAID:	the United States Agency for International Development [↗]
UNDP:	United Nations Development Program, an UN organization tasked with helping countries eliminate poverty and achieve sustainable economic growth and human development. [↗]
UNFPA:	United Nations Population Fund, an UN agency aimed at improving reproductive and maternal health worldwide [↗]
WHO:	World Health Organization, a specialized agency of the United Nations responsible for international public health [↗]

SOURCE: Alstonia Impact analysis

ALSTONIA IMPACT

Thank you!