Forecasting for Decision Making in International Public Health

Vineet Prabhu, PhD
HIV Market Intelligence, CHAI

Presented at:
Improving the Response of Global Public Health in a Fast-changing World
Joint UNICEF, UNFPA and WHO meeting with manufacturers and suppliers of in vitro diagnostic products, vaccines & immunization devices, finished pharmaceutical products, active pharmaceutical ingredients, contraceptive devices and vector control products
UN City, Copenhagen, Denmark

December 3, 2019
Objective of presentation

• Highlight challenges both demand and supply side face in serving public health needs

• Encourage both sides to work together – flexibility and transparency are key

• Urge continuous improvement including learning from other disease areas

(With apologies for the heavy reliance on HIV examples as that is the world I live in day to day)
Fact:

All forecasts are wrong!!

(_forecasters are simply aiming to minimize how wrong they are_)

3
At the very outset, important to consider what decision the forecasting exercise is informing.

Timescale of the forecasting exercise becomes paramount – next 12 mo. or 3-5 yrs from now?
For ensuring sufficient supply *(and thus confidence on the demand side)*, rough order of magnitude of market size (need) is most relevant pre-commercialization.

Albeit actual production will be proportional to actual demand (i.e. orders) in real time, production capacity cannot be rapidly changed on a sliding scale of in-between figures; a major learning from LPV/r pellet roll-out.
Different types of forecasting methodologies – think about context for appropriateness

**Consumption based**

- E.g. malaria drugs (ACTs)
  - Often inappropriately taken when fever develops – easily bought over-the-counter
  - Consumption may not have any relation to actual malaria prevalence
  - Past trends/seasonality reasonable inference of “demand”

**Morbidity based**

- E.g. ARVs for HIV
  - Will reflect programmatic targets for ART scale-up, retention, and treatment optimization
  - Based on national prevalence, with ART clinics as gatekeepers
  - Past consumption levels may only reflect a “floor” for demand

**Different contexts call for different approaches to be taken**
Multiple steps to introduce new product introduction, each with varying probabilities of success and timing across countries and even within a country in different years.

High level of uncertainty created – any global forecast must be grounded in quality country intelligence following the 80/20 principle.
Beware false precision!

- In many LMICs, record keeping is poor or requires (error-ridden) manual compilation for central level visibility
- Particularly acute for pediatrics where formulation and dosing is age and weight dependent
- Thus, it can be very difficult to have an accurate baseline view of the situation in country(s)
- Forecast output cannot be more precise than the baseline input

Uncertainty comes from underlying data quality – unnecessarily complicated models won’t fix that. Understand the level of precision that is reasonably possible and be transparent about it.
Success/failure in one programmatic area can affect market dynamics for downstream commodities

Don’t do things in a vacuum – underlying numbers for one commodity need to inform forecast(s) for related commodities
Funding – how much of the need can be supported? At what price point(s)?
  - e.g. underlying assumption on ARV forecasts is that drug treatment funding is the last thing to be cut if HIV funding decreases vs. for oral pre-exposure prophylaxis (PrEP) for prevention in otherwise healthy clients?
  - At its most basic level, \( \text{(available funding)} \div \text{(unit cost)} = \text{number of units that can be bought} \)

Finding the patients/clients – do they naturally interact with the health system?
  - E.g. Zn/ORS for childhood diarrhea was scaled up through consumer marketing and retail shop sales

How much demand generation is required?
  - Is a market being created from scratch (e.g. oral PrEP), or is it more a question of changing market shares to a more optimal product (e.g. TLD rollout)?

What infrastructure is required to support market growth?
  - e.g. number of molecular diagnostic tests (HIV/HCV/HPV/TB) that can be run is limited by number of labs/devices in country and their accessibility

Market context is a critical qualitative input into any forecast, including informing where one lies on the market sizing vs. demand forecasting continuum
Consider the bigger picture of market dynamics that can affect your sub-market of interest.

**Before dolutegravir**

1st-line NNRTI → Treatment failure → 2nd-line PI

**Question:** what will be the market shares between different PIs given a constant flow of patients from 1st-line, which in turn in growing?

**After dolutegravir (more durable than NNRTIs)**

1st-line NNRTI → Proactive Switch → 1st-line DTG

1st-line DTG → Treatment failure → 2nd-line PI

2nd-line NNRTI → Proactive Switch → 2nd-line DTG

2nd-line PI → Treatment failure → 3rd-line PI

**Question:** what will the overall PI market look like?

**Protease Inhibitor (PI) Market Over Time with Dolutegravir Introduction**

- New 3L PI Pts (post-DTG)
- New 2L PI Pts (post-DTG)
- New 2L PI Pts (post-NNRTI)
- Existing 2L PI Pts

**Proactive Switch**

**Question of when not if PI market shrinks in short term**

**Question of when not if PI market grows in long term**


It is important to adapt and change how one forecasts for a given market rather than accept the status quo approach.

NNRTI: non-nucleoside reverse transcriptase inhibitor; PI: protease inhibitor; DTG: dolutegravir
Being flexible and understanding the constraints of the other side to create a win-win

Supply

Seeking actual order commitments to sustain and de-risk business investments

Chicken and egg cycle

Demand

Seeking supply security and affordable prices before committing

- Clarity from demand side on what type of forecast is being presented and underlying uncertainty
- Transparency from suppliers on realistic production capacity, lead times etc.
Example of supply and demand side working together – ARV Procurement Working Group (APWG)

- **Quarterly Order Cycles**
  - Consolidating orders and coordinating timing

- **Monthly Business Calls**
  - Market intelligence sharing

- **Ad-Hoc Market Support**
  - Monthly calls with suppliers for challenging products

- **Biannual Newsletters**
  - Broad dissemination of market info

- **Quarterly Demand Forecasts**
  - Best available picture of demand from countries

- **Annual KPI reviews**
  - Continuous improvement

- **Product Availability Dashboards**
  - Available production capacity for delivery in-country this quarter
  - Limited production capacity for delivery in-country this quarter
  - No production capacity for delivery in-country this quarter

Creating a common platform for understanding, communication, and transparency while maintaining confidentiality as appropriate
- Be **clear on what decision** is being informed by a forecasting exercise – this affects what level of precision is needed

- Understand **interdependencies** of commodities – you are talking about the same patient/client!

- **Understand limitations** of your data sources and **beware false precision**

- Don’t accept the status quo – push for **continuous improvement** in forecasting

- **Learn new approaches** from other disease areas

- While uncertainty will never go away, supply- and demand-side **transparency** can help greatly reduce it
CHAI’s market shaping work on HIV commodities is made possible through the generous support of Unitaid, with complementary support from the UK Department for International Development (DFID) and the Bill & Melinda Gates Foundation.