



#### Role of Data Analytics in Healthcare Supply Chain Management



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#### **REGISTER NOW!**

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He is dynamic and intentional in pursuit for excellence. He has an unrelenting passion to enhance access and reach to quality and productive life in a sustainable manner.

He is a pharmacist and supply chain expert with over 10 years of experience strengthening health supply chain systems in Nigeria. He has also been an active member of our global community and the IAPHL Chapter in Nigeria.

#### AGENDA

Webinar on Role of Data Analytics in Healthcare Supply Chain Management Date: July 06<sup>th</sup>, 2023 Time: 12:00 PM West Africa Time, Duration: 60 minutes

No	Proposed Time	Activities	Facilitator
1	12:00 pm- 12:05 pm	Opening, welcome and introduction of Moderator; Housekeeping announcement, webinar objectives, poll1	Timi
2	12:05 pm- 12:10 pm	About Empower (4-5 slides) and few words on partnership with Empower	Prof. Andy
3	12:10 pm- 12:15 pm	Introduction of speakers	Timi
4	12:15 pm-12:25 pm	Presentation	Dr. Gladness
5	12:25 pm-12:35 pm	Presentation	Philip Oguche
6	12:35 pm-12:45 pm	Presentation	Prof. Andy
7	12:45 pm-01:00 pm	Q & A (10 min), closing remarks and poll 2	Timi & Empower

## **'HOUSE KEEPING' ANNOUNCEMENTS FOR PARTICIPANTS**

- Kindly mute your mic and turn off video
- Please ask questions using chat box and raising your hand (see icon)
- Please participate in poll so we know more about your interests
- Webinar recordings will be available in Empower School of Health YouTube channels
- The slide deck will be shared with all participants
- Please participate in all polls to better engage with us.

# **'HOUSE KEEPING' ANNOUNCEMENTS FOR SPEAKERS/MODERATORS**

- Please turn on your camera for a better engagement.
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#### **WEBINAR OBJECTIVE**

Explain the different roles of data analytics in healthcare supply chain management with a global aspect and a focus on the Africa region. Use data to implement logistics rights.

## **Poll #1: Background of Participants**

- I. What is your gender (Single Choice)
- Answer I: Male
- Answer 2: Female
- Answer 3: Others
- 2. What is your age (Single Choice)
- Answer I:<30
- Answer 2: 30-40
- Answer 3: 40-50
- Answer 4: >50
- 3. What geographical region are you from (Single Choice) Answer 1: America Answer 2: Europe Answer 3: Africa Answer 4: Middle East Answer 5: Asia Answer 6: Australia and Pacific Answer 7: Other

- 4. What is your academic background (choose highest one)
- Answer I: Pharmacy Diploma/Bachelors Degree
- Answer 2: Non pharmacy
- Answer 3: Advanced Degree/PhD
- Answer 4: Management
- Answer 5: Public health
- Answer 6: Engineering
- Answer 7: Logistics
- Answer 8: Other
- 5. How many years of work experience do you have?
- Answer I: <5 years
- Answer 2: 6-10 years
- Answer 3: 11-15 years
- Answer 4: Over 15 years
- 6. How did you hear about this webinar:
- Answer I: Empower Email
- Answer 2: IAPHL Email
- Answer 3: Empower Social Media
- Answer 4: IAPHL Social Media

## Empower School of Health *Our Capabilities*



Transforming the way people learn, workand save lives through digital learning Geneva | New Delhi

## **ABOUT EMPOWER**

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Empower has experience of working on digital content focused projects across the African sub-continent. The partnership is highly valuable in order to reach and scale the learning for last mile targeted users



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Dr. Denis Broun Director, Empower Swiss Former Executive Director of UNITAID, Director of UNAIDS and WHO



Dr. Magda Robalo, Former Minister of Health. Guinea-Bissau President, Institute for Global Health and Development





Dr. Nora Berra, Former Secretary of Health, France, former member of EU Parliament



Michel Sidibé, Africa Union Special Envoy for the AMA: Former Minister of Health and Social Affairs of Mali, former Executive Director of UNAIDS



Dr. S. Y. Quraishi Former Chief Election Commissioner and former Secretary of Youth Affairs and Sports, Govt, of India



**Prof. Bernadette** Nirmal Kumar

Lancet Commission advisor, Norway's top 100 most influential women 2020



Dr. Raj Shankar Ghosh Former advisor to the

Gates Foundation, Vaccines Delivery Expert





Henri Fourcault Director, Empower's Center for Leadership and Development Leadership Coach



#### Dr. Gladness Ladislaus Salema Senior Lecturer University of Dar es Salaam Business School



She is a senior lecture at the University of Dar es Salaam, with 17 years of work experience in teaching, research and consultancy. She is a public health logistician with a PhD in Logistics and Master in Public health. She has been teaching in the areas of operations management, managerial economics and supply chain management.

She has also conducted several research in health supply chain. Moreover, Gladness has consulted with both the public sector, private sector, research institutions such as Research for Poverty Alleviation (REPOA); as well as international organisations such as UNDP, UNFPA. She was the member of the 2017 holistic review of the health supply chain of Tanzania, which has led to the redesign of the health commodities supply chain.

# Information is the oil of the 21<sup>st</sup> century supply chains; and analytics is the combustion engine

Peter Sondegaard

Senior Vice President and Global Head of Research for Gatner

## **The Health Care Supply Chain Data**

□ Important features

- Multiple systems: Clinical and Operational
- Multiple stakeholders
- Designed for different purposes
- None has a complete set of data
- Incomplete data
- Inconsistencies



Data may be stored in different forms For example medicines quantity: cartons vs boxes Gender: Male and Female: 1/2: M and F

#### YOU MAY NEED A CENTRALISED COORDINATION

## What is Data Analytics



## **Data Analytics - Definition**

The **discovery** of meaningful patterns in data, is one of the steps in the data life cycle of collection of raw data, preparation of information, analysis of patterns to synthesize knowledge and actions to produce value (National Institute of standards, 2015)

Data collection	Methods & tools
Extraction	
Transformation	
Statistical analysis	Synthesis of knowledge from
Interpretation	information

Reporting





## **Types Of Data**

- Qualitative: Data that is represented either in a verbal or narrative format is qualitative data. These types of data are collected through focus groups, interviews, opened ended questionnaire items, and other less structured situations.
- **Quantitative data:** Data that is expressed in numerical terms, in which the numeric values could be large or small. Numerical values may correspond to a specific category or label
- Understanding quantitative data:
- i. Nominal: Label, gender, name, category (the number has no meaning)
- ii. Ordinal: Sequence/order (1,2,3) interval is irrelevant, traits can be ordered, leading to qualities such as larger/smaller, less/more, and better/worse
- iii. Interval: Values of the variable are ordered as in Ordinal, and additionally, differences between values are meaningful
- iv. Ratio : Variables with all properties of Interval plus an absolute, non-arbitrary zero point e.g.temperature

#### **Data Sources In A Supply Chain**



#### ADVANCE/MORE VALUABLE



#### **STEPS IN DATA ANALYSIS**

Validation & Transform: data Observation, Survey, case dissemination synchronization (check how studies; interviews; data was coded) in different questionnaires, focus group systems-Inconsistencydiscussions definitions, coding, naming HMIS, eLMIS Visualize data Which method will Analysis & Load/import interpretation you use? Cross check your data 6 Extract data **Retrieve and** Nominal data 5 collect data (categorical) use Providing additional 3 columns, bar charts, information that will Check, clean, tables, pie chart, pivot allow others to and prepare tables understand the data **Quantitative** data: meaning of the What data elements are needed? histograms, scatter plots results Where is the data? 2 **Data needed** Is there a data warehouse? Who is the contact person? Why important? Problem identification Who are interested 1 48 stakeholders

#### **Data Collection Techniques**

- 1. Using available information (HMIS, LMIS, DHS)
- 2. Observation:
- Participant observation: The observer takes part in the situation he or she observes.
- Non-participant observation: The observer watches the situation, openly or concealed, but does not participate
- 3. Interviewing (face-to-face)
- 4. Administering written questionnaires
- 5. Focus group discussions: A group of 6 12 informants

6. **Projective techniques**: researcher asks an informant to react to some kind of visual or verbal stimulus e.g. If you discover that your organization had to be privatized, you would......

7. Mapping and scaling: allows data collectors through their respondents to categorize certain variables that they would not be able to rank themselves

# What is the role of data analytics?

0

Platforms and technologies to support data analysis are already in Africa

Healthcare environment at present is not in shortage of data : eLMIS, DHIS, HMIS

 Supply chain management is a welldeveloped scientific discipline but has not been fully utilized in improving public health supply chains in developing countries.

As a result supply chains that serve patients in low-income countries remain **weak and ineffective**, putting treatment programs at **risk** and **weakening** the overall health system's ability to respond to the healthcare needs of the population



#### □Strengthen the Linkage between Supply Chain and Health Outcomes (Become demand-driven)

Though diagnosis of HIV is readily available in different parts of Africa, logistics involved in the testing can be complex, and prolonged waiting time to get results can cause psychological trauma for many people. Through the use of big data, Jérémie Gallien of the London Business School and his co-researchers were able to explore big data to reduce the logistics time for HIV testing, and thus improve the chance of early diagnosis of the disease (Deo et al., (2015)). Jérémie and colleagues did that by analysing logistics data of about 30,000 records containing information shipment records of samples from clinic to the laboratory and the eventual outcomes on patients.



#### Implement a Cost Management Program

- Identify cost-saving opportunities
- reveals hidden inventory reduction opportunities
- Manage the trade-off between Efficiency vs effectiveness goals (medical supplies Cost vs clinical outcomes)
- -what are high-utilization medical supplies?
- Are there possibilities of their replacement with low-cost comparable items, while ensuring clinical quality is maintained?
- □Informs on outsourcing decisions

#### **Strengthen collaboration between pharmacy (internal SC) and physicians**

- -identify high-utilization medical commodities, evaluate needs, identify waste and current shortages, disclose storage issues, and share data with clinicians
- **Waste reduction ( Do we have non-value-adding SC processes?)**, toward Lean SC
- **Supports Data-driven investments and prioritization of SC activities**
- Strengthen decision-making: compare, trend, describe, the inclusion of contextual factors

## Important factors to consider

- Effective SC monitoring
- Goal Conflicts- Multiple stakeholders; multiple directives; Multiple HSC
- Data quality (completeness and consistency)
- Organizational & Financial readiness (Champions)
- Solid and effective leadership; top management support
- IT Instructure capacity, Streamlining Information Flows, SC connectivity
- strong and skilled supply chain workforce (Excel, R, Python, or Tableau)
- Political will and government policy
- Anchore logistics/supply chain in the strategic vision
- National level consolidated data bases



Manager of Warehousing Chemonics International in Nigeria.



Currently, he works as the Manager of Warehousing at Chemonics International in Nigeria. Throughout his career, he has held various pivotal roles, including Supply Chain Information Systems Advisor, Malaria Advisor, and Responsible Pharmacist for a Distribution Center, among others. With his multifaceted expertise and comprehensive skill set, Philip has consistently delivered exceptional results in his professional endeavors.

He is a highly accomplished professional with a diverse educational background and extensive experience in business administration, supply chain management, and pharmacy. He possesses a Master's degree in Business Administration with a specialization in Finance and Investment from Ahmadu Bello University and a Bachelor's degree in Pharmacy from the University of Jos. Alongside his educational qualifications, he holds supply chain-related certifications such as CSCP and CLTD.



#### Introduction: Rights of Logistics and its Significance

The Rights of Logistics guide and shape logistics operations to effectively meet customer demands and expectations.

Adhering to these rights enhances customer satisfaction, reduces costs, and minimizes risks.

The rights provide a framework for decision-making, process improvement, and optimization, enabling efficient and reliable product delivery at the right cost

# **Importance of Data in Logistics**



Data enables informed decision-making and optimization of logistics processes by providing valuable insights from historical and real-time data



Accurate demand forecasting using data analysis helps organizations plan inventory, production, and transportation requirements, avoiding stockouts or overstocks and improving customer satisfaction



Data-driven tracking systems provide realtime visibility into the movement of goods, facilitating proactive decision-making, improving transparency, and enabling timely interventions to address disruptions or delays.



Performance monitoring through data and key performance indicators (KPIs) allows organizations to assess logistics performance, identify areas for improvement, and implement strategies to enhance efficiency and effectiveness.

# The Rights of Logistics



# Utilizing and leveraging Data for the Right Product and quantity

#### Demand Forecasting:

Data analysis for demand forecasting utilizes historical sales data, market trends, and customer behavior to accurately predict demand, informing production and inventory decisions.

#### Inventory Management. Data

analysis in inventory management optimizes stock levels by analyzing sales patterns, lead times, customer preferences, and production schedules, minimizing stockouts and holding costs while improving efficiency.

#### **Order Fulfillment:**

Data-driven approaches optimize order fulfillment by analyzing order history, availability, and timelines, enabling effective resource allocation and enhancing customer satisfaction

#### Product Data Accuracy: Accurate product data is crucial for logistics operations. Data management systems maintain up-to-date information on SKUs, descriptions, and dimensions, enabling efficient handling and delivery of the right product to customers

#### Real-time Tracking:

Tracking technologies like RFID, GPS, and IoT provide real-time visibility into product movements and quntity, enabling proactive decisionmaking and minimizing delivery delays.

## **Ensuring the Right Condition with Data**

Č V Health products contain active pharmaceutical ingredients (API) that are usually classified as time and temperature sensitive.



They need to be stored in specific storage conditions e.g., 15°C to 25°C, 2°C to 8°C, below -10°C, etc.



The shelf life of products needs to be monitored so avoid distribution of expired products.



Data-driven systems enable the monitoring and tracking of products, ensuring suitable conditions. Quality control, supplier management, real-time alerts, and compliance are facilitated through data analysis.

## Achieving the Right Time, Right Place, and Customer

**TIMELY DELIVERY:** DATA ANALYSIS ALLOWS ORGANIZATIONS TO ANALYZE HISTORICAL DELIVERY TIMES, TRAFFIC PATTERNS, AND OTHER FACTORS TO OPTIMIZE ROUTING AND SCHEDULING. BY LEVERAGING DATA, ORGANIZATIONS CAN IMPROVE DELIVERY ACCURACY, REDUCE TRANSIT TIMES, AND ENSURE PRODUCTS REACH CUSTOMERS ON TIME.

**LOCATION MANAGEMENT:** DATA-DRIVEN SYSTEMS ENABLE REAL-TIME SHIPMENT TRACKING AND LOCATION VISIBILITY, ENSURING PRODUCTS ARE ALWAYS IN THE RIGHT PLACE.

**CUSTOMER SATISFACTION:** DATA ENABLES ORGANIZATIONS TO UNDERSTAND CUSTOMER PREFERENCES, TAILOR LOGISTICS OPERATIONS, AND ENHANCE SATISFACTION AND LOYALTY THROUGH PERSONALIZATION

**DEMAND-DRIVEN OPERATIONS:** DATA ANALYSIS DRIVES EFFECTIVE DEMAND FORECASTING, ALIGNING INVENTORY, PRODUCTION, AND DISTRIBUTION TO MEET CUSTOMER NEEDS, REDUCING STOCKOUTS AND LEAD TIMES.

**DATA-DRIVEN DECISION-MAKING:** DATA-DRIVEN DECISION-MAKING OPTIMIZES RESOURCE ALLOCATION, ORDER PRIORITIZATION, AND CAPACITY PLANNING, ENHANCING OPERATIONAL EFFICIENCY AND MEETING CUSTOMER REQUIREMENTS EFFECTIVELY

# **Optimizing Cost with Data**



Data analysis enables cost analysis and optimization in logistics operations.



Leveraging data allows organizations to optimize routes, manage inventory, and evaluate suppliers effectively.



Data-driven monitoring of performance and cost transparency helps identify cost-saving opportunities.



Organizations can make informed decisions and achieve cost optimization through a data-driven approach in logistics.
# Conclusion

 In summary, data-driven decisionmaking is essential for successful implementation of the Rights of Logistics as it enhances accuracy, improves efficiency, enables proactive problem-solving, supports continuous improvement, and ensures evidencebased decision-making. By leveraging data effectively, organizations can optimize their logistics operations and align with the principles of the Rights of Logistics.





**Global Public Health Expert** 

He is the Professor of Public Health and Director of Capacity Development at the Empower School of Health.



He has over 30 years of experience of working with major International Funding Institutions, bilateral donors and the private sector in low and middle income countries. The main focus of his experience includes effective management of pharmaceuticals, vaccines and medical commodities, and especially the implementation of programs for the introduction of new medicines and rapid diagnostics for neglected tropical diseases.

He has undertaken donor funded activities in over 40 countries from provision of Family Planning commodities and the responses to the early onset of HIV in the 1990s, through The Global Fund grants in the 2000s, essential medicine provision in conflict zones, and extensive training in the Quality of Medicines.

Most recently he has authored the GOARN Supply Chains for Emergency Response Covid-19 Platform, pandemic preparedness training modules, and the Master Degree Course at Empower.















### Role for Data Analytics in Healthcare Supply Chain Management



Data Analytics Add Value to Healthcare Supply Chain Management



# Healthcare Supply Chain Data Analytics is not new



Medical Supplies for Cleopatra and ancient armies, 2,000 years ago



Managing Access to Medicines and Health Technologies





Data analysis When a large amount of quantitative data is available on costs, purchases, medicine consumption, and use patterns, it must be organized to facilitate analysis. Several other chapters offer suggestions for organizing data to facilitate analysis (see Chapters 28, 48, and 49).

First Published 1982

(d)msh



### **The Overall Premise**

- The Public Health Procurement and Supply Chain in low-income countries is borderline dysfunctional; is only improving very slowly; and is failing to keep pace with the shifting demand for the type, volume and delivery location of new health products – especially for Poverty Related Neglected Diseases (PRND)
- Lives are being lost, and patients are suffering because of its failures.
- The system is characterized by obsolete techniques, and little reliable data, and within the Public Sector even the concept of data use and supply chain analytics has been ridiculed.

### BUT

- Even in this environment, it IS still possible for the committed Supply Chain practitioner to utilize supply chain data analytical methods to drive improvements; to advocate and improve data collection and introduce modern methods of Supply Chain management.
- And YOU can make a difference by assisting in promoting and advocating for the -literally vital- role of Supply Chain Data analytics.



#### http://sc4ccm.jsi.com/findings-and-best-practices/



## The Realities of the Public Health Supply Chain in Low Income Countries

- World Health Organization (WHO) estimates that: "Nearly 2 billion people have no access to basic medicines, causing a cascade of preventable misery and suffering."
- https://www.who.int/publications/10-year-review/chapter-medicines.pdf
- "supply chains that serve patients in low-income countries remain weak and ineffective"
- *"Despite the large investments, the availability of medicines remains very poor in public health facilities"*
- "Several factors contribute to poor availability of medicines and health products at health clinics in government-run systems. The failure to use a systematic diagnostic of why supply chains are underperforming leads to ad-hoc projects that address only the surface symptoms of the underlying structural causes."
- <u>https://www.tandfonline.com/doi/full/10.4161/23288604.2014.968005</u>
- "Yadav said that in his personal experience, even the health center closest to the central medical store or hospital might be out of stock of at least 30 percent of the core medicines. This is not necessarily an infrastructure challenge, he said, but could be an **issue of poor information flow** and weak incentives."
- <u>https://www.ncbi.nlm.nih.gov/books/NBK241504/</u>





## **Supply Chain Failures Cost Lives The Delivery-Failure** 'Death Rate'

- Insufficient supply at the locations most needed was identified as one of the common barriers to access. The UN Commission noted that addressing barriers and ensuring access could save up to 6 million lives over five years and contribute to reductions in maternal mortality rates and under-5 deaths.
- <u>https://gcgh.grandchallenges.org/challenge/health-systems-</u> <u>strengthening-ensuring-effective-health-supply-chains-round-19</u>
- "The third gap is the implementation, or delivery, bottleneck. Even when medicines are readily available most health systems in poor countries have underdeveloped infrastructure, too few health workers, and patchy supply chains. More than 10 million deaths could be prevented each year, simply by delivering existing interventions to all who need them. This is the deliveryfailure death rate."

Reimagining Global Health: An Introduction: edited by Paul Farmer, Arthur Kleinman, Jim Kim, Matthew Basilico Effects and determinants of tuberculosis drug stockouts in South Africa



Seunanden and Day [6] found that TB drug stockout rates in South Africa were associated with higher death rates in 2011.

# Data: The Public Health Supply Chain's Biggest Challenge And Opportunity



- Currently, in most countries there are **no processes** by which information about consumption is systematically captured
- <u>https://www.tandfonline.com/doi/full/10.4161/23288604.2</u>
   <u>014.968005</u>
- In most cases, there are no processes by which information can be fed back into the system to provide data on what medications were financed, supplied, and distributed. In addition, data on use and demand are not supplied.
- https://www.ncbi.nlm.nih.gov/books/NBK241504/
- Even where data is "unlocked" from paper tools—meaning that that data and information becomes accessible to other staff within and outside of the facility — **weaknesses remain** in how data is analyzed and used. Integration and analysis of data from multiple sources, particularly consumption data, and triangulation of data remains challenging; data are rarely used in a systematic way to inform decision- and policy-making.
- <u>https://gcgh.grandchallenges.org/challenge/health-systems-</u> <u>strengthening-ensuring-effective-health-supply-chains-</u> <u>round-19</u>

Public health supply chains face two big challenges. The first is the availability of complete, accurate, and timely data. The second is isolated silos of data, which disconnect global supply chains from in-country supply chains.

https://pfscm.org/pfscm\_news/data-thepublic-health-supply-chains-biggest-challengeand-opportunity/



# No Data – An Example Of The Extent

- Recent survey of countries in SE Asia for WHO/GOARN response to Covid-19 pandemic emergency medical supply
- Data available for:
- Fill rate: 25% of countries, partial information
- For: stock our rate; days out of stock; expiry rate; damaged goods rate; stock value; holding cost; delivery time; transport capacity; lead time; procurement value;
- NONE





https://pt.slideshare.net/jsi/putting-cost-into-the-equationeconomic-evaluation-of-public-health-supply-chains-in-threeafrican-countries?smtNoRedir=1

### Even The Concept of Analytics And Data Use Has Been Ridiculed Within The Public Sector

- A widely used model in the commercial sector is the economic order quantity (EOQ), and the economic order interval (EOI)
- The Public Sector often views the EOQ as really "the square root of two times a guess, times a scientific guess, divided by a precise guess, times management's guess" and dismisses the process as being impossibly complex and useless because data will never be available.



$$EOQ = \sqrt{(2 \times U \times O)} \div (H \times C)$$

U = annual use, in units
O = incremental ordering cost
H = average holding cost (percentage of average inventory value)
C = projected net acquisition cost

### MSH, MDS-3, 23.9

<u>https://msh.org/resources/mds-3-managing-access-to-medicines-and-health-technologies/</u>



# Data Analytics Add Value to Healthcare Supply Chain Management

- Data analytics are offering innovative healthcare systems more visibility into supply chain management issues, allowing for reduced costs and greater efficiencies.
- Hospitals **spend nearly one-third of their overall operating expenses on healthcare supply chain management**. Buying supplies, equipment, and the latest innovations to support high-value care delivery is expensive, especially as hospitals and health systems expand their provider networks.
- Data analytics tools have the potential to give supply chain leaders insights into how to reduce their costs and automate their processes. One recent analysis found that analytics could bring a potential savings of almost 18 percent.
- But organizations aren't yet using them. Eighty-one percent of hospital staff in a recent Cardinal Health survey reported performing manual inventory management, and over onehalf (51 percent) said the number of manual processes in the supply chain was a significant challenge.



https://revcycleintelligence.com/features/dataanalytics-add-value-to-healthcare-supply-chainmanagement

### Failure To Use Analytics And Embrace Data Is Preventing The Supply Chain From Improving

- The failure to use a systematic diagnostic of why supply chains are underperforming leads to ad-hoc projects that address only the surface symptoms of the underlying structural causes.
- <u>https://www.tandfonline.com/doi/full/10.4161/23288604.2014.968005</u>

"Changing the paradigm - using metrics to define strategy and critical paths in public health supply chain transformation"



Diane Reynolds Technical Director, System Strengthening



#### Introduction

Management by performance is not a pervasive practice in the public health supply chain. Regular analysis of key data points is rarely utilized to collaboratively plan priority initiatives and understand root causes of crises. This hinders initiative impact and often results in wasted costs.

Since 2007, SCMS has been working with Ministries of Health in more than 20 countries to build performance measurement into their supply chain management, by transferring techniques, tools and industry best practices to in-country stakeholders.

National Supply Chain Assessment - Measuring Health Supply Chain

SCMS works collaboratively with country counterparts to identify metrics aligned with local contexts and national priorities as this is fundamental to program sustainability.

Materials and methods

Capability and Performance



Capability – Through a point-in-time comprehensive maturity and performance assessment, the MOH in Country X built consensus on a baseline of the current state of service, to benchmark improvement and prioritize strategic reform activities in their 5-year strategic plan.



Optimize –Analyzing patient behaviors utilizing data from patient dispensing systems in Country Z provided key insights to MOH on adherence to treatment and patient site retention which enabled effective health system interventions. Ensuring access to commodities is one of the essential components of patient adherence.



https://pdf.usaid.gov/pdf\_docs /PA00KGFS.pdf

# How Can You Possibly Undertake Any Analytics Or Even Basic PSM Management, With No Data?

Two opinions:

- "Data science doesn't make any sense without data"
- <u>https://strategiclearningtransformation.com/why-you-cannot-do-learning-analytics-without-data/</u>
- How to do data science without big data
- "You don't need a data warehouse to pursue important analytics initiatives."
- <u>https://enterprisersproject.com/article/2021/12/data-science-without-big-data</u>



**BIG DATA** 

LITTLE DATA,

Christine L. Borgman

SCHOLARSHIP IN THE NETWORKED WORL

Data collection begins with easily available, small data

### Making Data Analytics Work A Multi Pronged Approach

- Advocate for recognition of critical role of Data Analytics
- Data: Start with 'Little Data' (sample surveys) and 'Proxy Data' (data from similar systems) to develop models and algorithms and then seek to expand data collection
- Systematic strengthening: Theory of Change; Instill, scale, sustain
- Technology Leapfrogging: Mobile communications; digital data collection and analysis



#### Technology Leapfrogging: A Review of the Evidence A report for DFID



## **Data Analytics – The evidence**

 It has been well recognised that DA has the potential to substantially improve the management of PSCs (pharmaceutical supply chain). In particular, predictive techniques using machine learning algorithms have already proven high efficiency in providing accurate forecasts, thus contributing to tackling drug shortages and high inventory levels (Obayes, Al-A'araji, and Al-Shamery 2019; Amalnick et al. 2020).

https://www.researchgate.net/publication/353346220 Data analytics in ph armaceutical supply chains state of the art opportunities and challenges



Digital strategies, capabilities, and other critical factors can help countries become more digitally mature.

Greenfield	Early digitization	Emerging digitization	Digitization with advanced analytics (AA)	Future-state digitization
No utilization of digital systems for healthcare supply-chain management	Logistics- management information system build ongoing (with separate systems that are not linked)	Logistics- management information system established, integration underway with change program rollout started across country	Integrated logistics- management information system combined with AA techniques to improve system efficiencies	Full-scale system, fully automated, and all digital systems interlinked and operational (with linkages of supply chain and program or disease data)

### Data Analytics and Health Supply Chain- Critical Actions

Transforming global health supply chains through data visibility. McKinsey

- Health systems in emerging markets have not realized the benefits of data visibility to global health supply-chain operations. To do so, health-system leaders will need to take four critical actions.
- <u>https://www.mckinsey.com/industries/public-and-social-sector/our-insights/transforming-global-health-supply-chains-through-data-visibility</u>



Four critical factors can help countries achieve full data visibility.

# **Data Analytics Recognition- Donors**

Worldwide disruptions in accessing medical supplies due to the COVID-19 pandemic has underscored the need to improve the GHSC, especially in LMICs. This is where the private sector can help. Through strategic outsourcing and contracting with the private sector, government-run and donor-managed supply chains can build capacity in state-of-the art supply chain designs, data analytics, advanced business models, and stronger monitoring and procurement performance.

The most notable (Donor) example is PEPFAR.

Working with its partners in more than 50 countries, the US government since 2003 has invested over \$85 billion and saved more than 20 million lives and prevented millions of HIV infections.

*This colossal labyrinth requires sophisticated health supply chain management and tools.* 

Managers use sophisticated digital technology, such as real-time and predictive analytics, artificial intelligence (AI), commodity sensors, and the Internet of Things (IoT).

https://www.wbdynamics.com/wpcontent/uploads/2021/04/GHSC.4.23.21.pdf



# **Data: Start With 'Little Data' - Survey**

- Use survey data on small geographical area together with mathematical modeling.
- *"One strategy could be the use of* information and communication technology (ICT) or computerized systems that analyze local data use to drive the supply of commodities according to need"
- https://www.researchgate.net/publication/273166301 Health Product Supply Chains in Developing Countries Diagnosis of the Root Cause s of Underperformance and an Agenda for Reform
- Example: Supply chain of some ٠ medicines in health facilities in Jos, Nigeria: post Federal Ministry of Health mapping survey
- https://www.researchgate.net/publication/273166301 Health Pro duct Supply Chains in Developing Countries Diagnosis of the Root Causes of Underperformance and an Agenda for Reform

Toward health system strengthening in low- and middleincome countries: insights from mathematical modeling of drug supply chains



(a) The effect of investing in prevention (b) The effect of investing in road networks. programs.



(c) The effect of expanding the workforce. (d) The effect of investing in higher capacity vehicles.

https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-020-05549-z

195

# Little Data – Proxy data

- Example: Covid pandemic its new, there was no data (2020)
- Proxy Data (data from established sources used to study a situation, phenomenon or condition for which no direct information is available)
  - World Bank database on all countries, populations, and healthcare parameters (number of hospitals, beds, doctors, storage facilities and supply chain) – all of this data is preloaded to the tool for all countries
  - Imperial College London develops epidemiological model to predict how many cases using data from SARS, Avian Influenza and similar epidemics
  - <u>https://www.imperial.ac.uk/media/imperial-college/medicine/sph/ide/gida-fellowships/Imperial-College-COVID19-Global-Impact-26-03-2020v2.pdf</u>



### Delphic/expert team develop algorithms for supply requirements based on SARS and Avian Influenza models

 WHO team combines all this to produce Essential Supplies Forecasting Tool to determine quantities of health commodities required

### ESSENTIAL SUPPLIES FORECASTING TOOL

The tool provides the user with a choice among several epidemiological methods for forecasting COVID-19 cases, including an integration with Imperial College's Susceptible-Exposed-Infectious-Removed (SEIR) model.

https://www.who.int/publications /i/item/WHO-2019-nCoV-Tools-Essential\_forecasting-2022.1



### WHO COVID-19 Essential Supplies Forecasting Tool (COVID-ESFT) v4.1

#### v4.1 as of: Feb 15, 2022

#### WHO COVID-19 Essential Supplies Forecasting Tool Overview

SARS-CoV-2, a previously unknown coronavirus that emerged in December of 2019, causes COVID-19 and was characterized as a pandemic by the World Health Organization on March 11, 2020. The pandem around the world to develop containment and mitigation strategies to control the spread of COVID-19.

To assist with the response to the pandemic, the WHO developed the WHO COVID-19 Essential Supplies Forecasting Tool (COVID-ESFT) to allow users to quantify for commodities used in the course of patien The current version of the tool covers five categories of essential commodities: hygiene, personal protective equipment (PPE), diagnostics, drugs and consumables, and biomedical equipment for case manage designed to be user-friendly, and allow users to quickly estimate commodity needs. Please note that this tool is not designed to be an epidemiological model, though it does include epidemiological principle: of infections.

The primary user tabs are explained in detail below, with high-level summaries of back-end tabs at the end.

#### 'Inputs' tab

This tab contains the majority of the inputs used to develop the forecast

Sections

Explanation of Inputs

DISCLAIMER Summary of Updates Tool Overview Inputs User Dashboard Equipment List & Usage Pharmaceuticals Non-COVID Essential Services S ... 💮 🗄 📢

#### Using the WHO COVID Essential Supplies Forecasting Tool (ESFT)





#### https://hsc.unm.edu/echo/ docs/cdc-ipcdocs/forecast tool.pdf

### **Managing Supply Chain Pandemic Volumes**

Every month, frontline health responders around the world need these supplies (and more) to protect themselves and others from #COVID19



Coping with sheer volumes of Covid-19 products required will be a massive challenge for the supply chain. PPE are high bulk items

If you are fortunate enough to receive supplies – how will you receive, store and distribute such large volumes?



### What is so Special ?

Simply:

- The sheer SCALE of operations that will be required
- Most EPI programs are focused on newborns and infants – crudely, around 3.5% of the population
- COVID 19 Vaccine will need to reach at least 30% of the population in the first year

TEN TIMES GREATER VOLUME

- And on to targets beyond 60% of the population



Sierra Leone - 2021 Nucleion: 8,343,342



#### BEST PRACTICES IN SUPPLY CHAIN PREPAREDNESS FOR PUBLIC HEALTH EMERGENCIES

Technical Report

USAID | Global Health Supply Chain – Technical Assistance Multi Award IDIQ (GHSC - TA) Contract No. AID OAA I 15 00030 Francophone Task Order Contract No. AID OAA TO 17 00006

### International transport is a major bottleneck

- Limitations to airfreight is at present considered the single biggest challenge to global logistics.
- Despite the current increase in freighter flights, reduction in passenger flights are estimated to cause a 31% decrease in global air cargo capacity.
- · This has led to increased airfreight rates
- Sea freight is less affected with rates remaining constant



#### **Covid-19 Quantification Tool – PSM Examples**

EMPOWER

#### Medicine Requirements

IF you know your medicine use morbidity figures for COVID patients ( and only around 5 countries in the world do) then you can use them IF not the tool will calculate based on International averages/estimates Typically quantities per 40 patients

#### Drugs needed, estimated in bundles per 40 patients

22	CHLORHEXIDINE digluconate 1.5% + CETRIMIDE 15%, solution, 1000ml, bottle	100	195,622
23	CHLORPROMAZINE hydrochloride, eq.25mg base, tab.	200	391,245
24	CLOXACILLIN sodium salt, 500mg, powder, vial	600	1,173,734
25	CLOXACILLIN sodium, eq.250mg base, caps.	200	391,245
26	DEXAMETHASONE phosphate, 4mg/ml, 1ml, ampoule	400	782,490
27	DEXIMEDETOMIDINE, 100mcg/mL, IV, 2mL amp.	60	117,373
28	DEXTROSE (GLUCOSE) 5%, 1L, plastic pouch	100	195,622
29	DEXTROSE (GLUCOSE) 5%, 500mL, plastic pouch	40	78,249
30	DOXYCYCLINE salt, 100mg, tab.	600	1,173,734
31	EPINEPHRINE (adrenaline) tartrate, eq.1mg/mL base, 1mL amp. IV	200	391,245
32	FLUMAZENIL, 0.1mg/mL, IV, 5mL amp.	30	58,687
33	FUROSEMIDE, 10mg/mL, 2mL, ampoule	200	391,245
34	FUROSEMIDE, 40 mg, tab.	200	391,245

It then multiplies the average usage (consumption) by the number of predicted patients



#### Emergency Global Supplies Catalogue(COVID-19)

Complete with
budget prices
//www.who.int/docs/
t-
coronaviruse/20200
df?sfvrsn=f434134b 4 nload=true
Contraction of the local division of the loc
Global Supply Chain System (COVID-19)
Consume and Million State
(d) man Bennen

### **Covid-19 Quantification Tool – Dashboard**



### **COVID 19 MEDICAL EQUIPMENT**

- How to determine what you need
- MEDICAL EQUIPMENT
- WHO has produced a separate excellent guidance on medical equipment which will be required:
- List of priority medical devices for COVID-19 case management Access the document

Table 1. Medical Devices for Case Management of severe and critical pa

Tour Medical Parjanae	flemark e	Medical Device General Mana	Trage	Tradmand of spores	Transformersk of entired postcerets	Sad level	2red Levent	Just Level
		Infrared thermometer	x					
	Option 1- Desirable	Pulse aximeter - portable handheld, with cables and sensor		×	x		•	
	Option 2	Pulze azimeter - fingertip	x	×	x	•		•
	Option 1	Pulse animeter - lable top, with cables and sensor		×				•
Haritaring	Option 1- Destrable	Patient monitor, multiparametric, including EKG, nan invesive blood pressure (NBP), oxygen saturation (SpCQ), respiratory role (RB), tenperature (TEMP), with sensors and oables			x		•	9
	Option 2	Patient monitor, multiparametric, NBP, SpO2, TEMP, respiratory rate (FRI) with sensors and sables, (without EKG)		x	x		•	•
Oxygen freequi- Drygen requires to be selected according to spake life of the	Option 1: It is recommended that the device provides at feast 5 is 6 Union for adult parkers. This recommended that the device her electrical protection ( power surgel)	Concentrator 02, 10 L, with accessories		x	×	•	•	•
headth facility (i.e. power supply pipeline ocuser retwork)	Option 2 - Ciner Ishelfon enformentions are							

### **DID IT WORK?**

### Covid-19 Supply Chain System Assessment Comprehensive analysis

26 February 2021 The Yellow House

# Demand - What worked well

EARLY SIGNALS TO MARKETS DURING RAPID RESPONSE PHASE A COMPREHENSIVE TOOL FOR COUNTRY – LEVEL DEMAND PLANNING (ESFT)

### The ESFT launch and subsequent improvements



**31 March** Based on exponential epi curve



**1 May** S-I-R & manual options added for epi curve

All products updated based on updated WHO guidance



**27 Aug** 11 major updates: including products, move to weekly frequency, new UNDP population data

Tool went live on WHO website

Version 4

**Jan 2021** Planned update for epi curve (+Imperial college)

+ RDTs and new therapeutics

Started with ALL proxy data and models developed from proxy data. Constantly revised/improved as real data became available.

https://www.who.int/docs/defaultsource/coronaviruse/cscs comprehensive slide deck.pdf?sfvrsn=4be198fb 7&download=true

# **Theory of Change Simplified**

- Watch a short video here:
- <u>https://peoplethatdeliver.org/buildin</u> <u>g-human-resources-supply-chain-</u> <u>management-theory-change</u>







# **Stages of interventions** that aim to increase data use

Stages	Definition
INSTILL	The actions or interventions that support <b>the foundation</b> of a particular enabling environment in a specific jurisdiction and sub- group of people.
SCALE	The actions or interventions <b>to expand a data-use</b> enabling environment to new levels of the health system, new users or new geographies.
SUSTAIN	The actions or interventions that focus on macro, <b>system-level</b> <b>changes</b> that help permanently embed a data use culture across multiple levels of the health system, multiple geographies and multiple teams.

### Change pathways for data use definitions

Preconditions	Definition
TRUST	<b>Confidence and trust</b> in the data flows and the people who are data providers, so one can see the value in using the best available data (even if it is not perfect) to improve data quality and to make decisions.
KNOWLEDGE & SKILLS	All the <b>competencies needed to facilitate data use</b> , ranging from data collection, data analysis & visualization, data use, data reporting, data communication & data strategy development.
INCENTIVES & MOTIVATION	Motivation, rewards and recognition one receives for using data in decision-making. This should go beyond financial rewards.
STRUCTURES	The <b>reporting, administrative, and financial</b> mechanisms in place that facilitate and promote data use.
RESOURCES	Human and financial resources that provide the means needed to follow through on data use processes.
SYSTEMS	The <b>tools and processes</b> for data reporting, analysis and communication that facilitate data use.
POLICY	International, national and subnational <b>principles or policies</b> that codify data use as a necessary strategy for achieving results.

### How Do We Make It Work? Advocate – Example - Scale



http://1rqxbs47ujl4rdy6 q3nzf554.wpengine.net dna-cdn.com/wpcontent/uploads/2016/ 07/Pilot-to-Practice-Brief.pdf

Health System

Project



https://www.mckinsey. com/businessfunctions/operations/o ur-insights/supplychain-40--the-nextgeneration-digitalsupply-chain

# So What's The Problem – If There are So Many Success Stories ?

- They are all small scale
- We have not yet reached the 'tipping point' whereby the much needed major reforms will take place nationally/regionally/globally.
- It needs ALL supply chain practitioners to: advocate, explain, educate, build trust and promote the major concepts
- Recognize that you do not need a 'data warehouse' to undertake supply chain analytics – 'Little Data', can work
- Its NOT enough that YOU know you can also help by promoting the benefits and realities of Supply Chain Analytics – you don't need to be a medical doctor to help save lives.



# Now go and change the world





### **EMPOWER ONLINE COURSES**

Course Name	Туре	Duration (month)	Language
MSc in Global Health Procurement and Supply Chain Management	Masters	24/12	Eng/Fr
Post Graduate Diploma in Global Health Procurement and Supply Chain Management	PGD	12	Eng/Fr
Diploma in Global Health Procurement and Supply Chain Management	Diploma	6	Eng/Fr
Pharmaceutical Waste Management	Certificate	2	Eng
Advanced certificate course in supply chain management of COVID-19 related commodities	Adv. Certificate	3	Eng/Fr
International Careers in Global Health and Supply Chain	Certificate	2	Eng
Developing a National Health Laboratory System	Certificate	2	Eng
Financial Evaluation of Investments in Public Health Supply Chains	Certificate	2	Eng/Fr
Leadership in Global Health	Certificate	2	Eng/Fr
Procurement in Public Health	Certificate	2	Eng
Quantification & Forecasting in Public Health	Certificate	2	Eng/Fr

### **EMPOWER ONLINE COURSES**

Course Name	Туре	Duration (month)	Language
Product Selection and Technical Specifications for Public Health in PSM	Certificate	2	Eng
Inventory Management of Public Health Products	Certificate	2	Eng
Storage and Distribution of Public Health Products	Certificate	2	Eng
Promoting Effective Use of Medicines in Public Health Programs	Certificate	2	Eng
Procurement and Supply Chain Management Support Functions & Systems	Certificate	2	Eng
Emergency, Pandemic and Humanitarian Public Health Procurement and Supply Chain Management	Certificate	2	Eng/Fr
Risk Management in Public Health Procurement and Supply Chain	Certificate	2	Eng/Fr
Introducing new health technologies into public health supply chains	Certificate	2	Eng/Fr
Managing Product Quality Assurance in Public Sector Procurement and Supply Chains	Certificate	2	Eng/Fr
Procurement and Supply Chain Management for Medical Devices, Diagnostics and Equipments (MDDE)	Certificate	2	Eng/Fr

# Announcement of Master of Science in Global Health Procurement & Supply Chain Management (12-month and 24-month course)



### **Original Fee Structure:**

MSc 24 Month: Course fees: USD 8,000 (exclusive of taxes and bank charges).

MSc 12 Month: Course fees: USD 5,500 (exclusive of taxes and bank charges).

PGD 12 Month: Course fees: USD \$2500 (exclusive of taxes and bank charges).

### Note:

For the request/interest we will receive for any of the above courses from today's participants, a special concession on fees will be given to some deserving applicants. Please contact us with the questions regarding registration for any of the above courses.

### PROCESS FOR APPLYING FOR A PARTIAL SCHOLARSHIP PROGRAM

Applicants should send an email with their brief CV, a one-page note on how this course will be useful to them in their career and how it will improve supply chain management in their respective region.

The contact email addresses are operations@empowerschoolofhealth.org/or info@empowerschoolofhealth.org

All Application will then be reviewed by Empower School of Health.

Selected applicants will then be informed of the application and registration process.

Details of the course is also available on the website link and registration for the course: <a href="https://www.edu.empowerschoolofhealth.org/course/all-course">https://www.edu.empowerschoolofhealth.org/course/all-course</a>

### **Poll # 2**

- I. Was this information useful?
- Answer I:Yes
- Answer 2: No
- Answer 3: Somewhat
- 2. Which courses are you interested in?
- Answer I: Digital Health
- Answer 2: Data Management in supply chain
- Answer 3: Global Health
- Answer 4: Emergency Response
- Answer 5: Health Leadership
- Answer 6: Pharmaceutical Management
- Answer 7: Other (please write)
- 3. Which type of course you are interested in?
- Answer I: Certificate Courses (2-month)
- Answer 2: Diploma course (6-month)
- Answer 3: PGD Course (12-month)
- Answer 4: Masters Course (24-month)

Q&A

# Q & A Session

71

Please post your questions in the chat box





### Certificate of Participation

Presented to

For participating in the webinar on

<u>Role of Data Analytics in Healthcare Supply Chain Management</u> on 06<sup>th</sup> July 2023

Timilehin Omole Executive Director IAPHL

Andy Barraclough

Prof. Andy Barraclough Director - Education and Capacity Building