1 Week 6 Readings:

1.1 Reading (1/2): Mirage at the Bottom of the Pyramid, How the private sector can help alleviate poverty (Aneel Karnani)

1.1.1 Main Points

- Critique of the Bottom of the Pyramid (BOP) Proposition: Aneel Karnani's paper critically evaluates the BOP proposition, which claims that targeting the poor as a market segment is both profitable for businesses and beneficial for poverty alleviation.
- Argument Against BOP: Karnani argues that the idea of profiting from selling to the poor while alleviating poverty is at best an illusion and at worst a dangerous delusion. He suggests that the private sector should focus on viewing the poor as producers rather than consumers to genuinely alleviate poverty.
- Alternative Approach Suggested: The paper proposes that the only sustainable way to alleviate poverty is by increasing the real income of the poor through enhancing their productivity and buying from them, not just selling to them.

1.1.2 Problem Statements:

- Fallacies in the BOP Proposition: The paper identifies multiple fallacies in the BOP approach, including overestimated market size, underestimation of operational challenges, and a mismatch between the needs of the poor and the offerings targeted at them.
- Misrepresentation of Potential for Profit: BOP proponents suggest that significant profits can be made by targeting the poor, which Karnani argues is based on flawed logic and inadequate empirical evidence.

1.1.3 Key Supporting Evidence:

- Market Size Overestimation: Karnani highlights inconsistencies in defining the poverty line and the actual purchasing power of the poor, leading to an overestimated market size. Cost Challenges: The paper points out that the costs of reaching and serving the poor are high due to their geographical dispersion, cultural heterogeneity, and weaker infrastructure, which diminishes potential profitability.
- Questionable Impact on Poverty: Karnani argues that the consumption model promoted by the BOP does not fundamentally alter the income levels of the poor but rather encourages consumption patterns that may not be in their best economic interest.
- Real Income Solutions: The paper suggests that poverty alleviation should focus on enhancing the productive capacity of the poor and integrating them into the value chain as suppliers, which is more likely to have a sustainable impact on their income levels.

The paper concludes that the BOP proposition oversimplifies the complexities of poverty and markets at the bottom of the economic pyramid. It recommends a shift in strategy towards empowering the poor as producers and improving market efficiencies that can genuinely increase their incomes, rather than viewing them primarily as a consumer market. Karnani calls for more rigorous analysis and responsible practices in engaging economically disadvantaged populations in order to foster true economic development.

1.2 Reading (2/2): The Fortune at the Bottom of the Pyramid (C.K. Prahalad and Stuart L. Hart)

1.2.1 Main Points

- Argues that multinational corporations (MNCs) can achieve significant growth, profits, and societal contributions by targeting the billions of low-income consumers in developing countries. These consumers, who make up the majority of the world's population, represent a vast, untapped market and an opportunity for MNCs to drive both economic and social transformation globally.

1.2.2 Problem Statements:

- Despite the potential benefits, MNCs have traditionally overlooked the market represented by the world's poorest populations due to several misperceptions:
- The belief that poor consumers cannot afford or do not desire products and services from developed markets.
- The assumption that serving such markets is not economically viable due to existing cost structures.
- The notion that poorer regions only need outdated technology and cannot contribute to innovation.
- MNCs have previously focused predominantly on wealthier tiers, ignoring the bottom tier which encompasses a significant portion of the global population.

1.2.3 Key Supporting Evidence:

- Market Size and Growth Potential: The authors highlight that the 4 billion people living on less than $1,500 a year are an enormous market for scalable, low-cost solutions that meet basic needs and improve quality of life.
- Successful Case Studies: Examples such as Hindustan Lever Ltd.'s introduction of Wheel detergent in India demonstrate that innovative, culturally and environmentally sensitive business models can profitably serve bottom-tier markets. These initiatives not only lead to significant company profits but also foster social benefits such as increased employment and community development.
- Innovation and Sustainability: Serving these markets necessitates innovations in technology and business models, pushing MNCs to create products that are affordable and sustainable, potentially leading to applications even in developed markets.
- Economic and Social Impact: Investments in bottom-tier markets help lift populations out of poverty, contributing to global stability and reducing the risks associated with social decay and political chaos linked to wide economic disparities.

Prahalad and Hart argue that engaging with the world's poorest markets offers a dual opportunity for MNCs: commercial success and the chance to play a crucial role in global economic development. By rethinking their strategies and business models to include these markets, MNCs can drive significant innovation, profitability, and social impact, ultimately benefiting both their stakeholders and the global community.

2 Week 9: Business Models and Value Chains

2.1 Slides

- **Appropriate Technology Alone is not enough:**

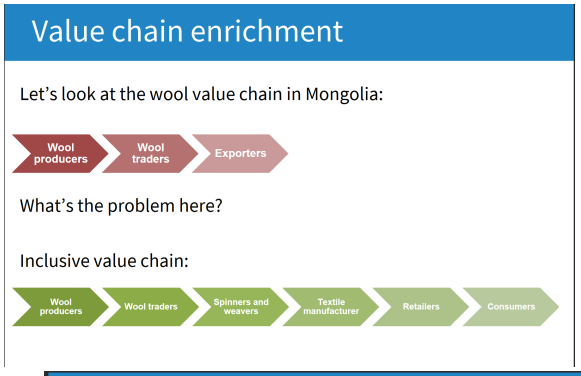
  - They neglect history and structural poverty/inequality
  - Misunderstanding the problem (root cause vs. symptom)
  - They attempt to substitute human talent rather than amplify it.
  - Absence of:
    * Mind
    * Heart
    * Will
    * (in program implementers and beneficiaries)
  - Risk aversion among end users
- **Also: Technologies fail to reach the poor**
  - Bottom of the Pyramid:
    * Over 4 billion make <$3,000 annually
    * Collectively known as the Bottom of the Pyramid (BoP)
  - BoP pay the highest price for the worst products
  - Servicing the BoP is a massive business opportunity
  - Essential products, like ORS (oral re-hydration salts), never reach them
- **The ubiquity of Coca-Cola**
  - Chronic water shortage: soft drinks have always been more available than water
    * One of the poorest regions in Mexico, running water a few days/week
    * Lack of wastewater treatment- raw sewage into waterways
  - Coca-cola factory plant has permits to extract more than 300,000 gallons of water a day- pays federal government not local
  - Residents of San Cristóbal and the lush highlands that envelop the city drink on average more than two liters a day.
    * Indigenous Tzotzil believe carbonated beverages can heal the sick
    * Kills many with diabetes: mortality rate from diabetes rose 30% between 2013 and 2016
- "If Coca Cola could reach even the most remote villages of the world, what's stopping us from delivering appropriate technologies and medicines to people who need them?"
- **Simon Berry: Field Trials**
  - Basic hygiene products are never available: ORS, Zinc tablets, Soap
  - Key Findings:
    * ORS is well known, but its supply
    * was too far and erratic
    * Mothers confused about dosage
    * 1L sachets are too big
    * Measuring water accurately is hard
    * Aspirational branding and affordability were important
  - **Solution: Kit Yamoyo:**
    * Attractive design
    * Zinc tablets
    * Soap
    * 200 mL ORS Sachets
    * Packaging doubles as:
      · A measuring cup
      · Mixing device
      · Storage device
  - "For every 1,000 kits sold, 3 lives are saved" - Simon Berry, ColaLife founder
- **Last Mile Problem(LMP) strategies that leave no one behind**
  - Cross-Compensation: One group of customers pays for the service. Profits from this group are used to subsidize the service for another, underserved group
  - Fee for product/service: Customers pay directly for the good or services provided by the enterprise
  - Market Intermediary: The enterprise buys material from the BoP, adds value to it and makes it available to a wider market
  - Cooperative: A for profit or nonprofit business that is owned by its members who also use its services, providing virtually any type of goods or services
- **The Inclusive Business (IB) Model**
  - Building bridges between businesses and low-income populations for the benefit of both
  - Commercially viable businesses that focus on the process rather than the outcome (profit)
  - This is how "searchers" approach the business challenge
- Features of IB Model:
  - Requires intra-sector and cross-sector partnerships to enhance market understanding, tap into new resources, share risk and increase impact/returns
  - Pulling off the right business approach is like putting pieces of a jigsaw together and may need multiple pilots
  - Inclusive business requires more innovation and perseverance than in conventional business
  - An inclusive business can also catalyze wider market change
  - Often requires the use of innovative finance tools (such as microcredit)
- **Case Study:: COCO ASENSO**
  - Background:
    * Over 15 million Filipinos rely on coconut farming for their livelihoods
    * 60% of those of them live in povert
    * Those on remote islands don't have supply chain access to big processing plants
    * So they produce a low-value product called copra
  - Predatory loan sharks ripping farmers off
    * They then sell the copra to predatory middle-men at very low prices
    * Prices are inconsistent, average annual income $620/yr
    * (Volatile price graph ranging from 500 USD per metric ton to 1500 USD per metric ton, with up and down spikes at a frequency of 5 years per cycle)
  - 2013 typhoon deals huge blow to coconut farmers in Philippines
  - Enter CocoAsenso:
    * Based in Paranas, a small impoverished town in the heart of coconut country in Samar

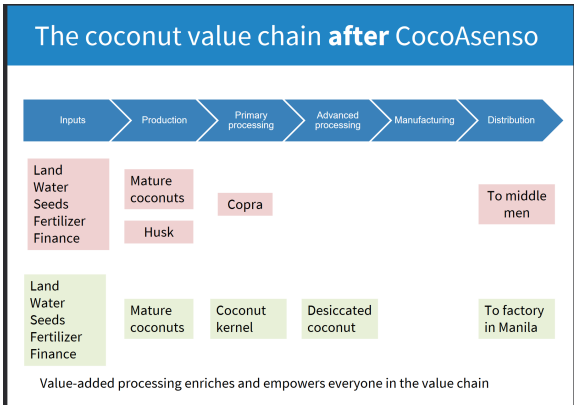
        * CocoAsenso buys coconuts directly from farmers at a fair price, increase average farmer's income by 85%
    - Employs the farmers in its factories
    - Adds value to coconuts
        * Instead of low-value copra, they produce desiccated coconut flakes
        * Pass part of the profit onto the farmers
    - Not having to spend time making copra, farmers can now plant cash crops

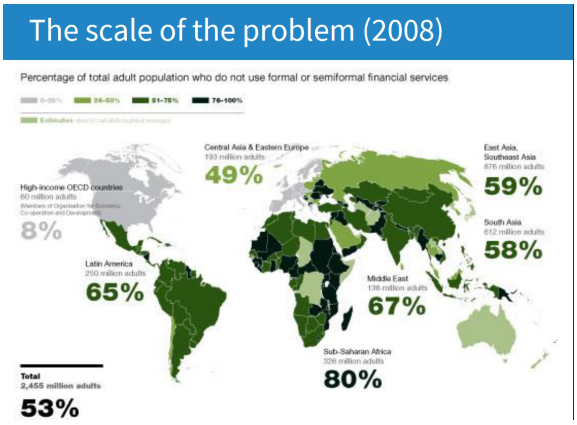
- **Financial Exclusion and Challenges for the Unbanked**
- What does it mean to be unbanked?:
    - Settle all your transactions in cash
    - Safeguard your savings at all times
    - Earn no interest on your savings
    - Unable to access formal credit
    - Can't send or receive money electronically
    - Can't buy insurance
    - (for companies) Difficulty buying stock or equipment from overseas vendors
- Case for financial inclusion (world bank analysis of Mexico): 10% increase in financial inclusion lead to:
    - 7% increase in employment
    - 5% increase in new businesses
    - 3% increase in GDP
- **Loan sharks**: Those who borrow money in the informal market are getting ripped off
    - Yearly interest rate are in the 40% - 200% range
    - In India, rates on street vendors can be as high as 5% per day
    - Study of money lenders in Pakistan found that average interest rate was 78.5% annually
    - Extreme variability of interest rates even within the same economy
        * Same study in Pakistan found that the standard deviation of interest rate was 38.3%
- **Microfinance:** Microfinance refers to the provision of all manner of financial services to low-income clients
- Microfinance Targets in the BoP:
    - There are over 10,000 microfinance institutes (MFIs), including Grameen Bank
    - MFIs reach 139 million underserved clients
    - Loan repayment rates are 90%+, Average loan interest rate is 30%
- MFI vs Government banks:
    - Government sponsored formal lending programs have typically been failures, with high default rate. They result in:
        * Rent-seeking
        * Politicization
- **Focus on MSME ((Micro, small, and medium enterprises))**
    - The main drivers of employment
    - But they can't grow if they can't borrow money
    - **Access to finance** is a greater barrier to growth than:
        * Corruption and crime,
        * A stable electricity network,
        * A poorly educated workforce
- Why are banks not lending to MSMEs?
    - The finance value chain is:
        * is time-consuming and complex at every stage in LICs but
        * there are some promising FinTech technologies that can lower barriers and increase loans to MSMEs
- **FinTech Case Studies: M-Pesa**
    - Financial Exclusion rampant in Kenya
    - In 2006, before M-Pesa was launched, 75% of Kenyans were financially-excluded
    - Businesses struggled to borrow, grow, and hire people
    - Average distance to the nearest bank was 9.2 km
    - Cash transfers were slow and risky
    - Safaricom launched M-Pesa in Kenya in March 2007 as a CSR initiative
    - At launch 7 out of 10 of Kenya's 11 million mobile phone subscribers were Safaricom customers -¿ Trust
    - The company allocated 400 of its pre-existing agents to act as cash distributors
    - No legal framework for mobile payment at inception
    - Today:
        * 40% of all adults in Kenya are using the service
        * 10,000 agents spread across the country
        * Increase in national remittances from 17% in 2006 to 52% in 2009
        * Significantly reduced transaction costs in Kenya
        * Average distance to the nearest M-PESA agent is 1.4 km
    - Today, you can pay bills using M-Pesa over the phone
    - M-Shwari was launched in 2013 which enables people to open a savings account
    - In 2015, M-Pesa launched a microloan service
    - Safaricom assesses creditworthiness based on mobile habits, top-up frequency and other proxy measures such as temple donations
    - Instant approval or rejection
    - Interest rates of 2% per month
    - In 2019, M-Pesa launched an overdraft facility services, Fuliza
        * This enables users who have insufficient funds in their wallets to pay bills
    - Fuliza lent 1 billion shillings in first week of launch
- **FinTech Case Study: Aadhar**
    - Why?: India's KYC challenge:
        * India had no national ID number for citizens
        * 4 in 10 births are unregistered
        * Many people do not receive government benefits (such as subsidized fertilizer) because:
            · They're ineligible due to lack of identification
            · Middle men have stolen them by assuming someone else's identity
            · Fiscal leakage: only 27% of welfare funds went to needy people

    - Most people work in the informal sector
    - Less than 2% pay income tax
    - 30% of driving licenses are fake!

- How Aadhar works:
    - In 2009 the Unique Identification Authority of India (UIDAI) was set up
    - Every citizen given a unique identification number (UID)
    - UID identifies individuals solely on the basis of
        - Photo
        - Fingerprint
        - Iris scan
    - Aadhaar helps poor residents easily establish their identity to financial institutions.
    - 1.22 billion are now registered, many in the BOP
    - "Voluntary"







2.2 Reading (1/1): Performance Over Promises (Kristi Yuthas and Evan A. Thomas)

2.2.1 Main Points

- The chapter focuses on the concept of "Pay for Performance" (P4P) in the social and environmental sectors. It advocates for linking funding to actual impacts and outcomes rather than merely to intended actions and inputs. The authors argue that this approach enhances accountability and efficiency in achieving social goals.

2.2.2 Problem Statements:

- Traditional funding models in social and environmental endeavors often focus on intentions and resources provided rather than the actual impacts. This has resulted in varying effectiveness, with many organizations failing to deliver on their promises, leading to skepticism among donors, government support reductions, and withdrawal of financial backers.

2.2.3 Key Supporting Evidence:

- Intent-to-Impact Cycle: The authors introduce a four-stage model comprising Intent, Interventions, Evidence, and Pay for Performance. This model emphasizes the necessity of closing the loop between intentions and actual impacts by ensuring that actions lead to measurable and beneficial outcomes.
- Performance-Based Contracts: The chapter details the structure of performance-based contracts which include clear performance indicators and measurable outcomes. This setup incentivizes organizations to focus on actual impacts rather than just activities.
- Randomized Control Trials (RCTs): Mentioned as the gold standard for providing reliable evidence, RCTs are highlighted as crucial in determining the effectiveness of interventions, although their applicability is limited in dynamic and complex environments.
- Challenges in the Sector: The text discusses the difficulties related to the traditional funding models which do not align incentives with performance, often resulting in inefficient use of resources and inadequate achievement of social goals.
- Emerging Approaches in Pay for Performance: Various forms of P4P like performance-based aid, incentives, and contracting are explored. These approaches are increasingly being recognized for their potential to realign organizational goals towards efficiency and impact.

3 Week 10: Fundamentals of Monitoring and Evaluation

3.1 Slides

- The Problem:
    - **1.6 million people die from diseases related to unclean water**
    - 4 million die each year from diseases attributable to indoor smoke inhalation
- Introducing: Solvatten
    - Promised to alleviate water cleanliness issues in LICs
- Impact evaluation, why focus on it?:

  - Surprisingly, there is little hard evidence supporting many development programs
    - e.g. Efficacy of microloans went unstudied for years since becoming mainstream
  - With better evidence, we can **do more with the same budget**
  - Instead of asking "do aid/development programs work?", we should be asking:
    - Which work best, why and when?
    - How can we scale up what works
- Defining impact:
  - Impact is defined as the difference between:
    - The outcome after the [technology] has been introduced
    - The outcome had the [technology] not been introduced at all
      - The "counterfactual" scenario
- **What is the counterfactual?:**
  - The counterfactual represents the state of the world that program participants would have experienced in the absence of the Solvatten
  - Problem: Counterfactual cannot be observed – it is entirely hypothetical
  - Solution: We need to "mimic" the counterfactual somehow
- How do we mimic the Counterfactual?
  - Randomized experiments (RCTs):
    - Use random assignment of the program to create a control group which mimics the counterfactual.
    - If properly designed, this is the most credible means of impact assessment
  - Non-randomized experiments:
    - Argue that a certain excluded group mimics the counterfactual.
  - If possible, always do RCTs
- (Graph): **RCT's** have gotten very popular lately, starting in 1980s and an exponential rise up to 300 published in 2014
- When to do randomized evaluation?:
  - When the stakeholders demand it
  - When there is an important question you want/need to know the answer to
  - You have the time, expertise, and money to do it right
- When NOT to do randomized evaluation?:
  - When the technology/program is premature
  - When the project is on too small a scale to randomize
  - If a positive impact has been proven using rigorous methodology and resources are sufficient to cover everyone
  - If you can synthesize meta-analysis from other studies to infer impact
- Notes about for example if the trend was already going down, how do we know if we made a difference or if it was already going to happen that way, etc
- Developing an evaluation strategy
  - Figure out what key performance indicators (KPIs) you need to measure to assess impact
  - Prioritize the most important indicators
  - Build and execute your RCT
  - Monitor your project
  - Analyze result
- **Choosing good impact metrics:**
  - Specific
    - Who, what and where
    - e.g. Number of Solvatten units delivered to the ministry of health office in Turkana district in Kenya
  - Measurable
    - How do you measure women's empowerment?
  - Reliable
    - Would two people monitoring that metric count it differently?
  - Time-bound
    - e.g. Number of Solvatten units delivered to the ministry of health office in Turkana district in Kenya between 2020 and 2024
- **Challenges with data collection:**
  - Comprehensive, household surveys are very expensive
  - Implementers must include questions to satisfy their data needs, as well as those of the funders
  - Figuring out what questions to ask is hard
    - e.g. you're interested in understanding a family's poverty level
    - Never ask the head of the household how much their "household income" is
  - Getting people to agree to agree to a survey is not always easy
  - Getting them to finish a survey is just as hard
  - Impossible to extract honest answers from people if trust doesn't already exist
    - Especially applicable with gender issues
    - People tend to crowd around when a survey taker is in the area
- Sensor Data Collection Challanges:
  - Weather stations and environmental data is sparse in LICs
  - Government surveys or census data is unreliable
  - Electronics carry heavy import duties
  - Severe restrictions of use of sensors
  - Skilled technical labor can be in short supply
- **Methods of Measuring Impact:**
  - Option 1: Prix Fixe
    - All grantees report on the same set of standard metrics
    - Typically works well for projects in industries with clear standards or regulations (e.g. microfinance)
    - KPI standards include Global Impact Investing Network's (GIIN) Impact Reporting and Investment Standards (IRIS+)
  - Option 2: A La Carte
    - Grantees choose from a menu of standard metrics
    - Typically works well for funders who want to get grantees started in impact measurement, but lack resources to invest in deep, high-touch capacity building

  - Option 3: Made to Order
    * Works well for funders and grantees working non-traditional sectors without established KPIs (e.g. mental health)
    * Requires a sizable investment in workshops to pick agreeable indicators and build the grantees' capacity
  - Option 4: Bring Your Own Lunch
    * Grantees come with their own metrics
    * Typically works well for funders who are new to the sector and grantees with a strong track record
    * Require substantial trust between funder and grantee
- Monitoring and Evaluations
  - **Evaluation**: When we answer an **impact** question, we need to compare what happened to what would have happened without the program
  - **Monitoring**: When we answer a **process** question, we need to describe what happened.
- **Freetown, Sierra Leone**
  - Highest annual rainfall in Africa
  - Western Area Pensinsula Forest Reserve
    * Global biodiversity hotspot
    * Watershed for 2M people
  - Water supply: National
    * Coverage: 74
  - Sanitation: City
    * Urban sanitation: 23
  - 60 informal settlements
    * Often built in flood plains
- 2017 Mudslide Disaster
  - 2017 Mudslide Disaster
  - De-forestation upstream increases water flow rate
  - Kroo Bay: Samba Gutter floods with rain
  - Claimed over 400 lives
- **Water Stress and Conflict in the Sahel**
  - In recent years there has been an increase in violence across the Sahel that is associated with climate change linked water stress
- Day Zero: Chennai and privatization
  - In 2019, Chennai experienced its worst drought in 70 years
  - Day zero: All four city reservoirs ran dry
  - Challenges
    * Population growth
    * Climate change
    * Large concentration of informal settlements
  - Private alternatives to municipal piped water cost 52x more and reduced equitable access
- Water Kiosks
  - The water kiosk is owned by the formal water service provider, which is also fully responsible for operation and maintenance
  - Each water kiosk is managed by a kiosk operator contracted to the utility
  - The kiosk operator sells water at an affordable set price, as stipulated by the water sector regulator.
  - The kiosk operator has to pay the utility according to the monthly meter readings. The kiosk operator receives a commission for every cubic meter of water sold.
  - Customers are allowed to use very small quantities of water free of charge in order to clean their buckets or containers.
  - The Residential Development Committee is involved in the implementation of the kiosk system
- **Leaks and contamination**
  - • 30-50% of Chennai's water supply is "lost"
    * Non-revenue water (NRW) problem
  - Many parts of Chennai receive water only 8 hours a day or less
    * Intermittent water supply (IWS)
- The world's sanitation needs
  - 3.5 billion live without safely managed sanitation
    * Defined as a private latrine from which excreta is safety removed and treated
    * Of those 2 billion do not have basic sanitation services
    * Defined as just a private latrine
  - As a result, many people openly defecate
    * Especially in India
  - Indian Governments Answer:
    * Swachh Bharat Mission announced in 2019
      · Eliminate open defecation
      · Construct 100 million community and household owned toilets
      · At a cost of $28 billion
  - **Impact of Poor Sanitation on Health**
    * 3.6 million people per year die from diarrhea and other water/sanitation related diseases
      · Half a million are children under five
    * Sanitation linked to poor nutritional status and stunting
      · Fraction of absorbed nutrients go towards fighting infections rather than growth
- Impact of Inadequate Sanitation on Poverty
  - Loss in GDP
    * 4% in sub-Saharan Africa countries; 6
  - Annual global economic loss US$260 billion
  - Women and adolescent girls disproportionately affected
    * Personal safety
      · Risk of assault in isolated areas
    * Reduced educational access
      · Increased likelihood of dropping out of school with onset of menstruation
      · Increased absenteeism due to menstrual cycles (study at Ethiopian school found 50% of girls miss school during menstruation)
    * Loss of income and reduced employment
      · Absenteeism among female factory workers during menstruation
- **EcoSan**
  - Ecological Sanitation

  - An approach to sanitation that strives to extract value from the elements in wastewater back to the natural cycle
    - Nitrogen, Phosphorus, Potassium as fertilizer
    - Water for irrigation
  - Decentralizes wastewater treatment
  - User-friendly, cost-effective
  - Sustainable in the long term
- EcoSan Innovations: Re-Inventing the Toilet
  - Launched in July 2011 by by Bill and Melinda Gates Foundation (Toilet 2.0)
  - Goal: household scale human waste processing system suitable for target population
  - Specifications:
    - Sanitize human waste within 24 hours
    - Off grid: No grid power/No running water/No sewerage plumbing
    - No added chemicals
    - Cost ¡ $0.05 per person per day
    - User appropriate: robust/easy to maintain/aspirational
    - No odor, no pests
  - Holy grail
    - Privacy
    - Personal safety
    - Pride of ownership
  - Challenges
    - Low processing rate
    - Variability proportionately more pronounced at small scale
    - Energy and cost efficiency harder to achieve at small scale
    - Users, not operators or maintenance workers
- Considerations for the future:
  - Business model
    - Lowering cost by mass production
    - Risks for early entry entrepreneurs - market does not yet exist (https://www.sankoya.com/)
    - Initial cost not likely to be affordable by target consumers - business model needed
  - Demand creation
    - Behavior change required, user training/education
    - Will users accept technology
  - Support "ecosystem"
    - Maintenance workers ("plumbers") – potential new job creation
- Menstrual Hygiene Management (MHM)
  - Disposable pads don't exist in a lot of LICs, especially rural areas in Africa
  - Many women use reusable cloths
    - In the absence of sanitary toilets, they can't clean the cloths properly
    - Pads are washed with dirty water
    - Dried in hidden areas

3.2 Reading (1/1): App Taps Unwitting Users Abroad to Gather Open-Source Intelligence; The Premise app pays users, many in the developing world, to do tasks like taking photos and completing surveys for clients including the U.S. military (Tau, Byron)

3.2.1 Main Points

- Premise Data Corp, a San Francisco-based company, uses a consumer app to mobilize a global network of gig workers, including many in the developing world, to perform tasks that inadvertently support U.S. military intelligence efforts.
- These tasks include taking photographs, filling out surveys, and collecting data on Wi-Fi signals and cell towers, which can be valuable for military operations.
- While about half of Premise's clients are private businesses, the company has also engaged with the U.S. military and foreign governments, suggesting a blend of commercial data collection with government surveillance activities.

3.2.2 Problem Statements:

- The ethical and privacy concerns arise as these gig workers, termed "contributors," are largely unaware that their collected data may be used for military and intelligence purposes. This lack of transparency poses significant ethical questions about informed consent and the exploitation of unwitting participants in potentially sensitive or hazardous intelligence operations

3.2.3 Key Supporting Evidence:

- Premise has received at least $5 million from U.S. military projects since 2017. The company proposed uses of its app for military intelligence, including mapping out social structures and covertly monitoring communication signals.
- The contributors complete tasks under the guise of ordinary activities, such as photographing specific locations, without knowing the potential military implications.
- A particular concern was raised by a user in Afghanistan who suspected that tasks assigned to photograph Shiite mosques could be used for spying, highlighting the potential dangers and misuse of the data collected.

4 Week 11: Case Studies in Agricultural Development and Nutrition + Global Health

4.1 Slides

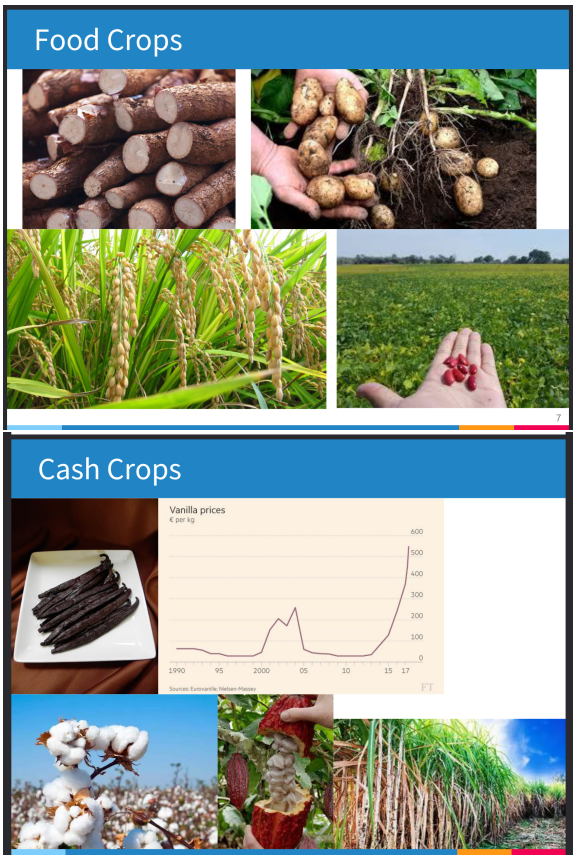
- **Food Crops vs Cash Crops (see images)**
- Why focus on smallholder agriculture?:
  - Of the 1 billion people living on ¡$1.25 a day, 75% live in rural areas
  - In Africa, 73% of rural dwellers are smallholder farmers, making them the drivers of many economies
  - Smallholders manage over 80% of the world's estimated 500 million small farms and provide the majority of food in LICs
  - Empowerment of women
    - 60% of farmers in LICs are women

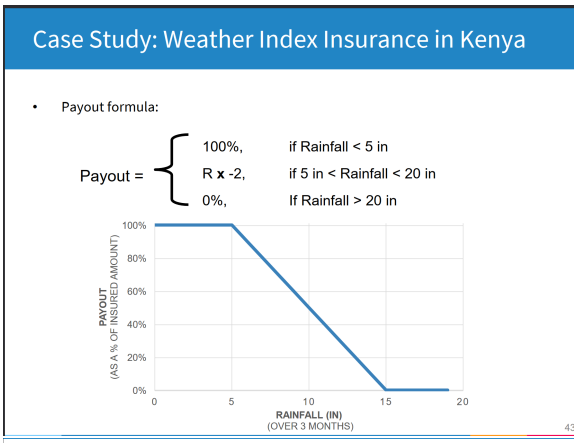
- **Food insecurity and the bigger picture**
  - Vicious cycles
    - Between conflict and food insecurity
    - Poverty (low productivity) and food insecurity
  - Food availability needs to double by 2050 but agricultural productivity worldwide is stagnating
- Challenges faced by Smallholders:
  - Land fragmentation
  - Overreliance on erratic monsoon
  - Soil Degradation
  - Poor road infrastructure
  - Slash-and-burn
  - Inefficient markets
  - Price volatility
  - Access to credit
- **Low-uptake of technology that could benefit them:**
  - High Yielding Variety (HYV) seeds
  - Irrigation systems
  - Postharvest processing
  - Crop Insurance
- Many opportunities for action on the agriculture chain, **focus topic #1: Irrigation**
- Traditional irrigation methods in LICs
  - Flood irrigation
  - Bucket irrigation
- **Appropriate Tech #1: Drip Irrigation**
  - Enables the growing of off-season fruits and vegetables, which generate extra income
  - Divisibility/Expandability: Can be made to fit small farms at an affordable cost to smallholders
  - Rapid payback: Risk-averse farmers can double their income in one grow season
  - Build climate change resiliency into smallholder agriculture
  - Build climate change resiliency into smallholder agriculture
  - Empowers women to grow crops on their own plot of land
- Irrigation Empowers Ethiopian Women
  - Agriculture in Ethiopia
    - Primarily rainfed (erratic)
    - Worth 31.2% of gross domestic product (2018)
  - Small-scale irrigation significantly increases women-headed households' income from crop and vegetable production
    - Housing/corrugated iron roofing and purchasing power increased by 38.2% and 37.2%
- **Appropriate Tech #2: Treadle Pump**
  - Low-lift, high-capacity and human-powered
  - Same benefits as drip irrigation
  - Higher yields and incomes than rainfed farming
  - Can increase farmer income by up to 6x (according to a study from Niger)
  - It could be "one of the most powerful and best targeted poverty-alleviation interventions the world has seen" – IWMI Report
- Appropriate Tech #3: Let wind do the work: Windpump
  - For smallholders with larger and more contiguous land holdings
  - For areas with ample wind
  - Can be self-built and self-maintained
  - Water may be used for consumption + drip irrigation
- **Focus Topic #2: Grain processing**
- Processing Fonio in Senegal
  - Fonio is a hardy grain grown in dry climates and can cope with poor soils
  - Crucial crop in West Africa (¿710,000 ha of fonio are grown each)
  - Feeds several million people during the "lean months"
  - It can provide an excellent source of food and income security
  - It is uncompetitive with other cereals (2x the price of rice)
    - Low productivity during the processing stage
    - Lack of technology to upgrade the value of the final product
  - Process: Threshing → Winnowing → Hulling and Whitening → Washing
- Appropriate fonio processing technologies:
  - Low-cost fonio de-huller
  - Greenhouse solar dryer
  - Rotating sieve for washing
- Adding More Value to the Chain
  - In response to demand from housewives in urban areas, small firms are now marketing processed fonio is supermarkets
  - Some fonio is exported to Europe and the US now
- **Focus Topic #3: Weather Index Insurance**
- Risk aversion from consumers:
  - Most technological products are expensive
  - Access to credit is limited
  - Consumer protection laws are weak in LICs
  - Customers are averse to large investments in new technological innovations, even if they are beneficial
- Case Study: Weather Index Insurance in Kenya
  - Meet Joseph (photo of man in cornfield)
  - If Joseph buys agriculture insurance, he will likely:
    - Plant more higher value crops
    - Invest more into his farm
  - Traditional indemnity-based farming insurance:
    - Joseph goes to Ahmed Insurance Group (AIG)
    - AIG estimate Joseph's crop value and his potential loss due to a drought
    - AIG agrees to insure Joseph for a monthly premium
    - If Joseph's crop gets damaged, AIG does a thorough investigation and pays him out
- Compared to alternative:
  - Weather index insurance (WII)

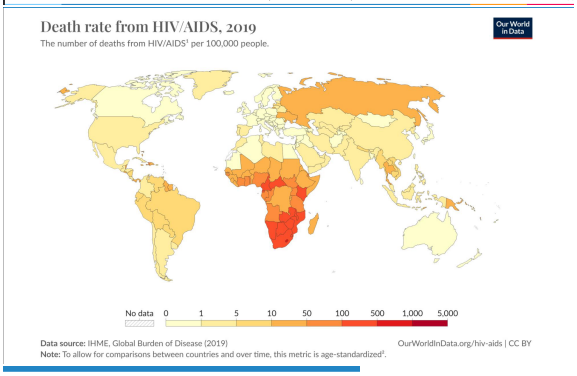
        * Insurance policy that pays out based if a certain event correlated with poor yields happens over a period of time (e.g. too little rainfall over 1 week)
    - How it works:
        * Joseph estimates his crop's value (e.g. $1,000) and expected crop loss due to a drought (e.g. $500)
        * Joseph decides to insure $500 worth of crop
        * AIG estimates his premium based on likelihood of a drought (e.g. 10%) =¿ $50
        * A third party uses weather stations to monitor rainfall throughout the season
        * If rainfall is below some critical threshold, Joseph gets paid instantly
    - Even though WII carries less risk for farmers, Joseph and others still didn't buy policies
        * Didn't trust the insurer or the weather data collector
        * Didn't have any cash on hand
        * Lacked insurance experience
    - Solutions to de-risk buying a policy:
        * Greater transparency: Provide farmers with regular SMS messages of rainfall measurements
        * Group plans: Selling policies to co-operatives
        * Bundling: Partnering with ministry of agriculture to provide subsidized irrigation systems with attached policies

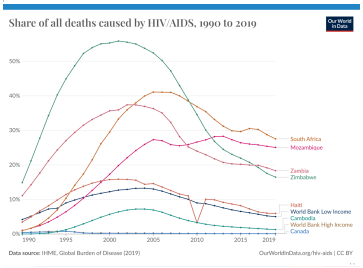
- **Focus Topic #3: Enabling effective co-ops**
- Technologies that get it right: **Digital Green**
- Problem:
    - Agricultural research and innovation produces many beneficial technologies and techniques each year
    - However, many smallholder farmers do not adopt them
    - In the 1950s, "agricultural extension" emerged worldwide
    - In the 1970s, the World Bank Training and Visit (T&V) approach was adopted by extension agencies
    - Successful but expensive and ineffective at reaching remote and older farmers
- The Innovation
    - Digital green organizes rural communities to share knowledge on improved agricultural practices and livelihoods through locally-produced videos
    - Human-mediated dissemination
    - Grassroots, participatory model that amplifies the efforts of existing, effective farming co-operatives
- Impact
    - Increased adoption of agricultural technologies and practices by 7x
    - 10x more cost effective than traditional extension efforts
- Why it worked
    - Video is just the medium; it is people and social dynamics that ultimately make digital green work
    - Local social networks are tapped to connect farmers with experts; the thrill of appearing "on TV" motivates farmers
    - Homophily is exploited to minimize the distance between teacher and learner

- **Communicable Diseases**
    - Prevalence of gonorrhoea
        * Gonorrhoea is a sexually transmitted infection (STI) of increasing concern
        * Caused by Neisseria gonorrhoeae (NG)
        * Second most common bacterial STI
        * 87 million new cases each year
        * Disproportionately impacts low- and middle-income countries and marginalized groups
    - Symptoms of Gonorrhoea infections are hard to detect
        * Infections are often asymptomatic or mild and non-specific
        * Untreated gonorrhoea can lead to severe health complications:
            · Pelvic inflammatory disease
            · Ectopic pregnancies
            · Infertility
            · Increased risk of acquiring HIV and other STIs
        * Syndromic approach to diagnosing gonorrhoea drives misdiagnosis and unnecessary treatment
    - Traditional diagnostic methods:
        * Bacterial culture
        * Microscopy
        * Nucleic acid amplification tests (NAATS)
    - Research Gap for NG diagnostics
    - Diagnostic access is limited in resource-constrained settings due to:
        * Cost
        * Necessity for dedicated testing sites
        * Need for specialized equipment
        * Lack of access to continuous power
        * Social stigmas
    - Point-of-care (POC) tests can resolve these issues but none have been designed to test for AMR









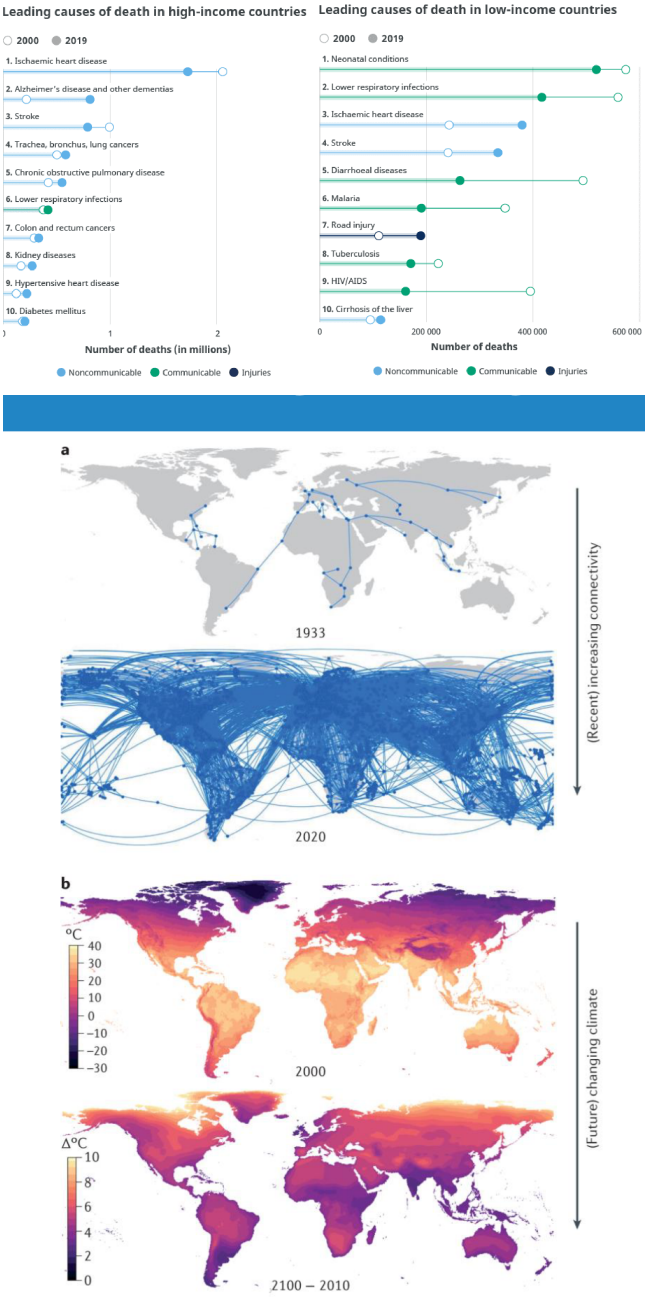
4.2 Reading (1/1): MDR Tuberculosis in Peru

Explicitly stated as NOT being on final

5 Week 12: Case studies in Disease Surveillance

5.1 Slides

- **Case studies in Disease Surveillance**
- WHO recommendations on cholera:
  - Public health surveillance for cholera should include:
    - health facility-based surveillance, community-based surveillance, and event-based surveillance for the timely detection and reporting of suspected cholera cases;
    - timely reporting of standard minimum case-based data;
    - routine and systematic testing of suspected cholera cases;
    - routine analysis and interpretation of surveillance data at a fine granularity (local level);
    - regular dissemination of surveillance outputs to guide multisectoral interventions;
    - timely reporting at national, regional and global levels.
- Quote from The Lancet:
  - In low-income and middle-income countries, zoonotic disease surveillance has advanced considerably in the past two decades. However, surveillance efforts often prioritise urban and adjacent rural communities. Communities in remote rural areas have had far less support despite having routine exposure to zoonotic diseases due to frequent contact with domestic and wild animals, and restricted access to health care. Limited disease surveillance in remote rural areas is a crucial gap in global health security. Although this point has been made in the past, practical solutions on how to implement surveillance efficiently in these resource-limited and logistically challenging settings have yet to be discussed.
- **Technologies for Infectious Disease Surveillance**
  - Increasingly recognize the need to track and record the spread of infectious disease
  - Technologies in this space have advanced considerably in recent years
    - Genomic informed pathogen surveillance
      - Whole genome sequencing
- Whole genome sequencing of Ebola
  - West African 2013–2016 epidemic caused by the Ebola (EBOV) virus was of unprecedented magnitude, duration and impact- case fatality is around 50
  - NGS study to track Ebola spread:
    - Compiled a dataset of 1,610 publicly available full EBOV genomes
    - Association of geography, climate and demography with viral movement among administrative regions
- Next generation sequencing capacity
  - 70% of capacity is outside of national public health institutes
  - Resource intensive!
    - Initial capital: estimated at US$100 000–700 000
    - Equipment for library preparation, quality control
    - Computing infrastructure
    - Supply chains
- Mapping changes: travel & climate
  - The global international air travel network expanded substantially from 1933 to 2020
  - Average monthly maximum temperature in 1970–2000 and difference between 2070–2100 and 1970–2000 averages
  - See included figures (heatmaps and connected graph of world map)
- Earth Observation: map infectious disease
  - Human cases of several climate-related infectious diseases, including tick- and mosquito-borne diseases are increasing
  - Predicting and mapping the risks associated with these diseases using environmental and climatic determinants derived from satellite images
    - research, surveillance, prevention and control activities
- **Flooding in Kerala due to monsoon**
  - Linked to paddy cultivation
  - Linked to abundance of E. coli in water
  - Linked to acute diarrheal disease



5.2 Reading (1/1):The Integrated Behavioural Model for Water, Sanitation, and Hygiene: a systematic review of behavioural models and a framework for designing and evaluating behaviour change interventions in infrastructure-restricted settings

5.2.1 Main Points

- The article introduces the Integrated Behavioural Model for Water, Sanitation, and Hygiene (IBM-WASH) aimed at guiding the design and evaluation of behaviour change interventions in settings with limited infrastructure.
- The IBM-WASH framework encompasses three dimensions (Contextual Factors, Psychosocial Factors, and Technology Factors) that affect behaviour across five levels (structural, community, household, individual, and habitual).

5.2.2 Problem Statements:

- Existing models guiding Water, Sanitation, and Hygiene (WASH) interventions often focus predominantly on individual-level determinants, largely neglecting the roles of technology and environmental contexts. There is a clear need for a comprehensive model that integrates multiple dimensions and levels influencing WASH practices.

5.2.3 Key Supporting Evidence:

- Systematic Review Findings: A review of existing WASH models highlighted gaps, particularly the underrepresentation of technological factors and the environment's influence on behaviour. Out of 15 references identified, only 9 directly addressed these broader factors.
- Development of IBM-WASH: The framework was informed by a systematic review, relevant literature, and feedback from ongoing formative and pilot research associated with two cluster-randomized trials.
- Applicability of IBM-WASH: The proposed model was applied in real-world settings, receiving feedback through various presentations and workshops, which helped refine and adapt the framework to ensure it effectively supports the design and evaluation of WASH interventions.

6 Week 13: Incentivizing Behaviour Change

6.1 Slides

- **Incentivizing Behaviour Change**
  - Motivating individual behaviour change
    - Reading: Integrated Behavioural Model for WASH
  - Motivating non-profit behaviour change
    - Reading: Performance over promises
- How do we measure handwashing with soap (HHWS)?:
  - Proxy indicators:
    - Knowledge- what do you know about handwashing?
    - Presence of handwashing facilities
    - Demonstration of practice
  - Direct indicators:
    - Self reported behaviour
    - Obeserved behaviours
    - Soap Sensors
- Motivations influencing HWWS:
  - Disgust (being aware of contaminating matter on hands)
  - Affiliation (doing what everyone else is doing)
- Barriers to changing HWWS:
  - Physical Barriers
    - Availability of soap and water
  - Social Barriers
    - Norms- is it a social norm to wash hands
    - Mass media coverage
  - Biological
    - Other priorities for bodily effort/energy (esp Mothers)
    - Disease
- Incentivizing non-profit behaviour change
  - Performance over promises:

    * The common goal of nonprofits and social enterprises is to create positive social and environmental change. Yet the effectiveness of organizations in creating these changes varies greatly and the positive contributions of some organizations is debatable. In the absence of positive impact, some organizations are cost-ineffective in use of valuable resources that could be put to better use in making positive change.
  - Pay for performance: is the payment of money or other resources contingent on achievement of a performance goal
  - From a linear flow of resources to a closed loop cycle (see image)

- Elements of pay-for-performance
  - **Performance**: The agreements made between partners will include process for measuring and evaluating performance. Outcome and/or impact goals are specified and related performance indicators are identified.
  - **Incentives**: In performance-based contracts, at least part of the payment is linked to performance outcomes.
  - **Risk**: Linking rewards to performance creates increased risk for implementing partners.