Joint Learning Network for Open Dialogue & Exchange

Virtual Learning Exchange: COVID-19 Human Resources for Health

Shared Learnings

Topic 1: Assessing and Mobilizing Health Workforce Capacity

Challenges in Workforce Capacity

The COVID-19 pandemic brought about countless challenges in assessing workforce capacity and mobilizing human resources. The surges of infected cases overwhelmed available human resources while health care workers who were infected needed to isolate and temporarily leave the workforce for weeks at a time. Moreover, as the pandemic continued, the mental health of the workforce increasingly became a concern.

Experts and practitioners from multiple countries identified the following major challenges:

- **Insufficient evidence-based guidelines and available HRH data to inform workforce distribution:** For some countries, there has been a lack of a master plan and inflexibility in existing plans that were neither demand-based nor population-based. Leaders managing human resources lacked updated information systems to keep records and information of health workers in both the public and private sectors. Overall, data collection has been challenging during the pandemic.

- **Imbalances in workforce distribution & lack of flexibility in redeploying the workforce:** A major issue has been the inadequacy of specialists and providers in some areas of the country while having a relatively higher ratio of specialists/providers to population in other areas of the country. This skewed distribution of specialists and providers manifested between public and private health facilities as well as between rural and urban regions. Additionally, female health workers were reported to have faced challenges as a result of their gender roles at homes and lacked sufficient representation at national-level COVID-19 decision-making bodies. Lastly, as COVID-19 infection hot spots moved over time, human resource needs varied and required adjustments but there was a paucity of effective strategies for redistributing available resources quickly and efficiently.
Supporting health care workers’ physical and mental health and well-being:
Common challenges included high rates of COVID-19 infection amongst the health workforce with subsequent depletion of effective health workforce numbers, stigma and violence against health care workers, and issues with psychosocial support for health care workers.

“We don’t know the active stock of the health workforce as a whole. From the Ministry, we only know the number and capacity of health care workers in public health institutions. In our country, we also have the private sector and also the military health workforce. As public-private partnership is not well-established, we cannot take the private health workforce into consideration. Likewise, the strength of the military health workforce cannot be included because of political issues and the upcoming election. As there is no health insurance system, franchising of some health services to the private sector is also a big challenge.”
- JLN NODE HRH participant

“The COVID-19 pandemic has disproportionately affected health care workers (HCWs) in our county. Shortage of personal protective equipment (PPE), coupled with insufficient measures for infection prevention and control (IPC), Water, Sanitation, and Hygiene (WASH), and psychosocial support has resulted in high rates of COVID-19 infection amongst HCWs. The high rate of infection amongst HCWs has depleted the health workforce in many of our level facilities [and] equally the primary care facilities because staff had to cover isolation wards opened for critical patients and led to disruptions in delivery of essential health services. The barriers are increased instances of violence and stigma against HCWs. The strategies will be that we must do our best to maintain continuity of essential health-care services while freeing up capacity for the COVID-19 response by training, repurposing and mobilizing the health workforce according to priority services. Those who are quarantined or isolated at home need to be supported, and some need specialized care services. This is a big challenge for all countries, I know, but one that we must tackle together so that no one is left behind. We must set the following strategies to be able to work effectively and efficiently with the lean health workforce that exists:

- Make transparent and evidence-informed decisions about which health- and social-care services are essential and which may be postponed, deferred or delivered through other means
- Train, repurpose and mobilize the health workforce to meet the surge in demand
- Protect the physical health of frontline health workers
- Provide them with mental health and psychosocial support.”
- JLN NODE HRH participant

“The biggest challenge in assessing the health workforce capacity during the COVID-19 pandemic in Nepal is the lack of an updated HURIS (Human Resource Information System) and TIMS (Training
Management Information Centre). These information systems are used by the government to keep records and information about government health workers. Besides, the unavailability of updated information on health workers in the private sector is also another challenge.”
- Sudip Ale Magar (Public Health Officer, Ministry of Health and Population, Nepal)

**Strategies to Address Challenges in Workforce Capacity**

To address these challenges, countries have pursued a variety of strategies:

- Expanding scope of practice through **task sharing/shifting** and modifying **scope of practice laws**
- Using **telehealth** to bridge human resource gaps caused by skewed distribution of the health workforce, and increase workforce availability to patients while reducing patient and provider exposure to COVID-19 infection.
  - Online training sessions to connect community providers with specialists
  - Remote monitoring to allow critical care specialists to monitor multiple wards
- **Deploying a national workforce** (military, public health officers) to increase staffing at hotspots
- Maintaining an **active database of available health workers**, skills, roles (along with local needs)
- **Canceling all non-essential procedures** and visits to increase staff availability
- Creating a **pool of health workers for emergencies** to easily mobilize specialists

Specifically, in Nepal, some strategies that have been discussed or pursued included: (1) Health worker mapping in both the government and private sector (2) Capacity building and training activities (3) Formation of additional pool of health workers especially for case investigation and contact tracing (CICT) in each local level in Nepal (4) Motivation like hazard allowance for front line health workers.

For the challenge of risk assessment of health care workers, some recommended strategies included:

- Identifying workers at considerable risk of acquiring SARS-CoV-2 in the healthcare setting and focusing resources on active monitoring or proactive laboratory testing. Health workers with high risk of succumbing to the COVID-19 infection are kept away from the frontlines as much as possible.
- Supporting implementation of quarantine measures for a specific group of health care workers, minimizing the effect on the workforce and maximizing containment of SARS-CoV-2 within the health-care environment.
- Use of self-quarantine after contact to maximize containment of SARS-CoV-2 within the healthcare environment, especially in workers who may have no, few, or atypical symptoms and
reduce anxiety among health care workers about contracting SARS-CoV-2 in the workplace from colleagues with known exposure.

Of these, the priority topic selected for a deeper discussion was: “Expanding scope of practice through task sharing/shifting and modifying scope of practice laws”

Expanding Scope of Practice

Examples of scope of practice expansion

- In Myanmar, graduating medical students volunteered for contact tracing. In order to do this, they were trained in donning and doffing of personal protective equipment as well as obtaining and transporting test specimens to labs.
- Policies often limited trained health care workers from the private sector from being assigned medical roles, so they were usually assigned non-medical roles.
- In Nepal, retired health care workers as well as those from the private sector joined the public health response in roles such as case investigation and contact tracing.
- Moving part-time health care workers into full-time roles.
- In South Africa, more than 200 health care workers from Cuba came to assist the country. They were deployed into different provinces and were experts in various fields including epidemiology, health technology engineering, biostatistics, public health, and family medicine.
- In South Africa, HIV service providers who conducted voluntary medical male circumcisions (VMMC) pivoted into community screening for COVID-19. VMMC services were stopped and staff and infrastructure were redirected to the country’s door-to-door COVID-19 screening campaign. Nearly 600 staff, including clinical (medical doctors, clinical associates, and nurses) and non-clinical (HIV lay counselors, data clerks, drivers, and community mobilizers) were trained in the basics of COVID-19 community screening. Training was done by an NGO. Some of the topics covered were IPC procedures, identification of symptoms, and referral pathways for testing. VMMC community mobilisers joined community health workers. Other resources such as branded uniforms for the VMMC program and vehicles were used.

Challenges of expanding scope of practice

- Concerns about the legal ramifications for patient dying under the care of someone working under expanded scope of work (death of a patient or serious events due to wrong clinical procedures or inadequate knowledge and skill)
- Accreditation challenges, working with medical and nursing councils
- Health care workers need to be quarantined after working, which exacerbated HRH shortages
• Challenge in training retired health workers and making sure they are up-to-date with the latest technologies and protocols
• Having confidence in health workers who have been out of practice prior to the COVID-19 pandemic
• Concerns about health (older age with comorbidities) of retired health workers
• Patients’ preferences for doctors over nurses and paramedic health workers and patients’ preferences for specialists over generalists
• Maintaining checks and balances sufficient to protect both health workers and patients
• Obtaining support to acquire new and additional resources required for expanding scope of practice

Strategies for expanding scope of practice
• Myanmar
  o What is needed to make task shifting work?
    ■ Define which tasks are easily transferable (e.g. less complicated tasks)
    ■ Find the right person to whom to transfer tasks (e.g. public health supervisor)
    ■ Training needed for recipient of task shifting - needs to address skills, responsibility, and motivation
    ■ Pooling of volunteers with a way of assessing volunteer skills
    ■ Buy-in and approval from leadership
    ■ Ensuring that quality of care will not be compromised
  o Lessons from example of task shifting for midwives
    ■ Did not explore whether the recipient was interested in taking over the skills and roles. need to ensure recipients are interested in their new roles.
    ■ Need to define the goal for task shifting
    ■ Need to communicate clearly with the recipient about goals and support for new role
    ■ Not just about task-shifting but about shifting responsibilities
• Nigeria
  o Deployment of rapid response teams by the Federal Government to support response in all states
  o Training of primary health care workers and Patent Proprietary Medical Vendors (PPMVs) and their integration into response activities
  o IPC training on best practices and minimum standards for tertiary and private hospitals (in Kebbi and Imo State)
  o Training of coordinators of partner organizations on contact tracing and deployment of volunteers for surveillance activities
- IPC training for home-based care (in Lagos)
- Training of Red Cross personnel on the use of community-based information management tools to dispel stigma and rumors
- Laboratory scientists of the Nigerian Air Force Medical Corps were trained on sample collection, packaging, and transportation

- Nepal
  - Key strategies
    - Basic capacity building activities like training and orientation on additional tasks
      - Rapid training and deployment of community health worker and doctors to enable them to shift tasks and successfully engaged lower-level health workers
    - Development of standard treatment protocols, standard operating procedures, job aids for task shifting
    - Establishing a clear communication channel for task shifting
    - Additional financial and non-financial benefits - administrative and policy decisions were ratified to make incentives quickly dispersed
    - Informed consent from patients receiving treatment
    - Continuous supportive supervision for quality assurance
    - Addressing the challenge of limited hospital capacity (fewer than 10,000 ICU beds)
      - Developed command system for case management
      - Partnered with private hospitals and dedicated at least 20% of the hospital beds for COVID-19
      - High dependency unit (HDU) (step down from ICU-level care)
      - 24-hour COVID-19 hotline to provide support and information for frontline workers
      - Telemedicine services to support people isolated at home
    - Delegating decision-making power
      - Nepal’s federal government delegated power to the provincial and local levels, which moved authority to community levels for quick decision-making
    - Adapt to different geographic regions
      - Need to focus on remote, mountainous regions where there are few health care workers
      - Task shifting more important in these areas as lower level health care workers end up doing clinical work
- Designate deputy personnel when original health care worker is not able to be there

○ Key considerations
  ■ Task-shifting and task-sharing cover both clinical and non-clinical tasks
  ● Clinical tasks are services that health care workers provide at hospitals or at patients’ homes
    ○ Medical officers offered counseling and screening for cases through a 24-hour hotline service
    ○ Paramedics and lab staff were engaged in sample collection for testing and contact tracing
  ● Non-clinical tasks included management, logistics, decision-making, and communications

○ Future considerations
  ■ Need to evaluate task-shifting and assess patients. If it is effective, lessons could improve task-shifting implementation in the future.
  ■ It’s important to note that task-shifting is not permanent. This needs to be communicated. It should be a usual and normal part of the job (skill-based) to quell the gap in human resources.
  ■ Legal/political barriers to task-shifting being lifted or changed will help with task-shifting in the future
  ■ Motivation of healthcare workers who are overburdened or low on capacity must continue to be improved. This includes volunteers and the private sector health workers and volunteers.
  ■ Sustained support and motivating activities for their evaluation and monitoring their quality of care and spirit of working

● Morocco
  ○ Health professionals from the armed forces have been deployed to help with the civilian health response to the COVID-19 pandemic.
  ○ At the start of the pandemic, sick patients could only go to public health care facilities, after very few private clinics were involved in caring for the sick. This period of the start of the pandemic was characterized above all by the upgrading of the health care system with a lot of investment, in particular the purchase of resuscitation beds and artificial respirators.
  ○ The health staff carried out monitoring missions for patients and contact persons at home. During the first three months (when cases were low), there was a staff dedicated to COVID cases. Afterwards the number of cases became more and more important and the strategy changed. Health professionals have also been deployed near the sick,
particularly in remote areas in order to provide support to remote communities. This has resulted in great fatigue among health professionals with attacks among them with COVID-19.

- Need to establish a culture of merit and recognition for health professionals, and above all a special status of health workers as a profession and find solutions to increase the number of health workers in the private and public by increasing the training sites for health professionals.
- To be successful in the future, Morocco must develop more training of paramedics and health professionals, including recruitment and hiring doctors from outside of Morocco, for example in Senegal and other neighboring countries, to minimize staff shortages.

- **Ghana**
  - Quick training systems with emergency command center from previous Ebola response along with SOPs
  - Retired health care workers were trained and sent into specific centers
  - For incentives, there is a need to define who is a frontline worker

- **South Africa**
  - The government of South Africa employed registered doctors or healthcare workers who were privately practicing, retired, or unemployed. At this time, private practices that may not have been seeing patients were included. Also, 217 Cuban doctors provided care in South Africa.
  - Community health workers were deployed to rural areas (“vulnerable areas”). All of these healthcare workers who were employed by the government were trained. The army was mobilized to help move health care workers to rural communities. (43% of healthcare systems operate in rural areas, but only 20% of nurses and doctors were based in rural areas.)
  - Mental health support
    - Vula Mobile (app) was used then scaled nationally for health care workers to utilize for mental health support
    - Organizations with mental health resources banded together to provide resources for health care workers
  - Future strategies for success
    - Moving to digital platforms such as Vula Mobile will be an important strategy for future success
    - Training more healthcare professionals, including those from outside the country, with a recruitment strategy for training these professionals
    - Addressing health care worker concerns about health risks needs to be part of communications to motivate the workforce
**Topic 2: Training & Motivating the Health Workforce**

Challenges and strategies shared by HRH participants

Surges of critically ill patients with COVID-19 have necessitated rapid and emergent redeployment of the health workforce to new roles or locations across the world. To do this rapidly, effectively, and safely, properly training, motivating, and incentivizing the workforce is key in order to effectively support health care workers while addressing the significant human resource needs. In the JLN COVID-19 HRH group, experts and practitioners from multiple countries identified the following major challenges:

- **Training the health workforce:** There has been limited training, especially to respond in emergency situations. It takes a long time to get healthcare workers trained and into vacancies.
- **Motivation of healthcare workers:** Motivation and retention of healthcare workers has been an important issue in many countries, particularly in rural areas.
- **Mental health support:** Healthcare workers have high anxiety from contact with SARS-CoV-2. Maintaining strong mental health for healthcare workers was challenging.
- **Supporting female health workers:** Female health care workers tend to provide caregiving and home duties in many societies around the world. COVID-19 added the pressures of both the possibility of bringing the infection back from health facilities as well as increased home duties such as childcare.
- **Monetary incentives:** Many countries experienced challenges in development and implementation of monetary incentives for health workforce:
  - Amount of incentives: The amount of incentives often failed to meet the expectations of healthcare workers.
  - Delay of payments: Delays in payments could cause a doctor and nurse to leave the workplace.
  - Eligibility of health workers for the incentive: With limited resources, many countries designed the incentive scheme prioritizing the clinical staff (i.e. doctors and nurses). It lowered the motivation of other types of healthcare workers and caused conflicts among the health workforce.
  - When the government failed to meet the expectations and miscommunicated with a diverse range of healthcare workers, strikes occurred in several countries.

**Strategies to Address Challenges in Training and Motivation**

To address these challenges, countries have implemented a variety of strategies:

- Developing COVID-19 standard operating procedures (SOPs) and training manuals
● Partnering with health professional associations for training, consultation, community awareness
● Utilizing online trainings to extend trainings to more health workers and facilities
● Increasing payments or providing awards for longer hours or hazardous work
● Providing childcare, transportation, and quarantine housing for health care workers
● Providing free mental health services for health care workers

Of these, the priority topic selected for a deeper discussion was: “Developing and implementing SOPs and training manuals,” including development of personal interest and motivation (monetary and non-monetary incentives)

● “It is essential to follow the same direction.” - Momodou Cham (Ghana)
● “It enables the health workforce to work on the same platform for management and prevention of COVID.” - Khin Thu Htet (Myanmar)

There were common needs in developing and implementing SOPs and training manuals:

● Update of SOPs/guidelines according to the new scientific evidence-based updated WHO guidelines
  ○ Rapidly changing SOPs/guidelines affects reliability and adherence to these guidelines.
● Contextualization of the guidelines according to different situations
  ○ Need to update according the changes of the local situations
  ○ “We need to implement different strategies in different environment and contexts” - Victoria Adubia Twum (Ghana)
● Timely distribution of SOPs and guidelines
● Development of the strategies to motivate healthcare workers to follow the manuals

Developing and implementing SOPs and training manuals

Examples of developing and implementing SOPs and training manuals

● Developing SOPs and training manuals
  ○ Global recommendations (e.g. WHO guidelines) were reviewed and adapted for the local contexts.
● Dissemination platform
  ○ The central government of Myanmar shared SOPs and manuals through its website and Facebook. They informed the users that the guidelines were updated frequently and prohibited them from downloading the documents.
Training health workforce
- Ghana set up command centers for contact tracing and education throughout the districts.
- In Ethiopia, health workforce were trained in partnership with professional associations. Health professional associations established consortium to support training, consultation, and community awareness. Professional associations were engaged to train the health workforce in other countries as well.
- Nigeria utilized training institutions to disseminate training for all health workers. During the lockdown period, the use of technology enabled continuing the training online.

Development of motivation strategies: monetary incentives
- Many countries developed incentive schemes for healthcare workers in increasing payments or providing awards for longer hours or hazardous work.
- In Ghana, frontline workers (doctors, nurses, biomedical scientists – anyone working on frontline response; for government employees) received a 50% salary increment and tax rebates as well (for 6 months) as a form of motivation.
- In Pakistan, special incentives were provided to people working in ICUs. Champions from each hospital were identified and selected to receive high profile awards for high quality and extra work.
- Nigerian government increased hazard allowances for frontline healthcare workers.

Development of motivation strategies: non-monetary incentives
- Providing childcare, transportation, and quarantine housing for health care workers

Strategies for developing and implementing SOPs and training manuals

Philippines
- Context
  - Philippine healthcare system has a public and a private sector. Private dominates 60-70% of the health sector
  - There is a big gap in the health workforce which leads to a deficiency of active healthcare workers (HCW). The reasons of the gap:
    - Underemployment
    - Misemployment (deskilling such as to secretary, call center),
    - Unjust working conditions
    - Unemployment
- Literature review: healthcare workers’ experiences and view from the pandemics
1. Physical health, safety, and security: concern for self and others, practical and environmental issues
2. Workload
3. Stigma
4. Ethical, moral and professional dilemmas: not being able to attend to patient’s psycho-emotional needs
5. Personal and professional growth: sense of fulfillment and accomplishment whenever a patient survives
6. Support to and from others: family and friends, colleagues and peers, organizations, media and the public
7. Knowledge and information: communication and training
8. Formal support

- Incentive schemes in Philippines
  - Private Sector
    - Private sector was the first to provide support and motivation to their healthcare workers.
    - COVID-19 Action Network Philippines called for donations for healthcare workers. It motivated healthcare workers as showing their efforts were appreciated.
  - The government provided compensation for 100,000 pesos in case/based on death, illness, etc.
    - On March 24, the government declared the state of national emergency and expanded health workforce capacity
    - Republic Act allowed the health workers to receive COVID special risk allowance to ensure 15-day segments of protection
      - Life insurance, accommodation, transport, meals
    - Assumption of all medical expenses for public and private healthcare workers
  - Medical community
    - In August, healthcare workers asked the government for a ‘time out’ to re-strategize.

- The Healthcare Professional's Alliance Against COVID-19
  - What is the Healthcare Professional's Alliance Against COVID-19?
    - A loose coalition formed in response to COVID-19 infodemic
    - Initially, 15 healthcare professionals from different specialties started the alliance, more than 1 million of healthcare workers joined.
What has the Healthcare Professional’s Alliance Against COVID-19 been doing to respond to the COVID infodemic?
- The alliance has coordinated communication with the government. It urged the need of strengthening the Health Technology Assessment Council to assess and review the scientific evidence information and to share to the public. Currently, the alliance is represented in the national task force against COVID.
- With partnerships, it has been communicating with local chief executives, clinicians and other colleagues in relative fields, and patients.
- To disseminate adequate information, the alliance conducted press conferences, and it has run websites and social media.

What needed to make it work:
- It needs a committed group of people with love to country, dedication to truth, and commitment to science.
- It needs to be a non-partisan and apolitical group.
- It needs moral ascendancy and public trust.

Nigeria
- What needed to make it work:
  - Good stewardship and leadership from government
  - The Presidential Taskforce on COVID-19 provided leadership with support from the Federal Ministry of Health and the National Center for Disease Control
  - Professional groups and representatives from organizations were involved in developing the SOPs for testing and treatment of COVID-19 infection
  - Ample representation from different groups (medical and dental association of Nigeria, and the group of midwives, nurses, lab scientists) enabled buy-in from health workforce.
  - Global recommendation & Local context: Nigeria adopted global recommendations for the COVID-19 pandemic response but these were implemented based on the local context.
  - Provision of right equipment (PPE, etc): for adherence to the SOPs
  - Mass, online and print media: used to disseminate SOPs

- What are the future plans to improve the strategies?
  - To continue the engagement with stakeholders
  - To periodically review the SOPs and get feedback from the health workforce
**Myanmar**

○ Best practice in Myanmar: sharing information through social media and MOH website
  - Myanmar shared evidence-based information and messaging materials in online platforms, such as the government website and social media.
  - The content included case loads, SOPs, training manuals, guidelines. Materials were updated accordingly.
  - They provided electronic devices (tablets) to the healthcare workers to ensure the access the information.

○ Strategies to motivate healthcare workers
  - Ministry of Health and Sports in Myanmar:
    - recognized effort of healthcare workers and volunteers,
    - provided hotel rooms to healthcare workers,
    - built trust among healthcare workers and communities,
    - paid special allowance to healthcare workers, and
    - implemented new policy to support community-based healthcare workers to provide primary care and education to communities

○ What was needed to make the practice successful?
  - Leadership support at Ministry of Health
  - Evidence-based information and guidelines
  - Volunteers
  - Financial flexibility to provide incentives

**Ghana**

○ Reasons for success in HRH strategies
  - The government shifted the priorities to COVID-19 to find and mobilize resources. It provided financial support (i.e. tax rebate) to frontline healthcare workers, which helped to motivate healthcare workers to training and redeployment.
  - Professional bodies mobilized and committed significantly. For example, they made a new requirement: minimum of one COVID training became necessary to be licensed next year.
  - Groups of healthcare workers organized and worked as one unit. It helped healthcare workers to know each other’s strengths and build camaraderie.
  - Managers and supervisors closely managed everyone’s work and the overall responses.
  - Ghana had established the basic training schemes for the infection prevention and control before the COVID-19 pandemic occurred. Since they already had
training manuals, they had to update the manuals. The work was less intensive than starting from the scratch.

- **Malaysia**
  - Malaysia could mobilize the emergency plans quickly since it had established emergency plans to respond to SARS and MERS.
  - There were four areas of response: (1) facility, (2) motivation, (3) finance, and (4) human resource.
    - **Facility:** Malaysia increased bed capacity and dedicated COVID-19 hospitals. Hotels and convention centers were turned into housing, testing, or quarantine centers. Ventilators and other resources were distributed and closely monitored. They made advancements in digital technologies for healthcare.
    - **Motivation:** Healthcare workers were given extra incentives as workload increased. The public came forward taking turns to send food and even donating face shield, PPE, etc.
    - **Finance:** Malaysia has achieved universal health coverage since the 1980s. Everyone has access to healthcare. Under the Prevention and Control of Infectious Diseases Act 1988, all treatment for people affected by COVID was completely free. Trust was set up to accept donations.
    - **Human resource response:** Malaysia redeployed the healthcare workers and mobilized retired clinicians. Clinicians in masters programs were brought back to clinical care. Volunteers were recruited from private and public sectors. The Ministry of Health collaborated with the Ministry of Defense. They worked with clear SOPs.
  - More innovation in IT integrated systems is needed to support contact tracing and data management.

- **Uganda**
  - Health worker motivation is important to ensure those amidst chaos and fear, the health workforce are encouraged to continue with the delivery of services.
    - Motivation is more critical especially when health workers are infected themselves because it is difficult to fulfill their responsibilities while navigating taking care of themselves. How to protect loved ones at home is another big worrisome issue confronting the health workforce during the COVID-19 pandemic response.
  - Community of learning should be created across the entire chain of care.
Everyone is aware of what needs to be done, such as infection prevention and control, medicine distribution.

To share information online,

- it should be free to healthcare workers at all levels,
- people should be able to timely access the information, and
- the information and the process should be accurate.

It can ensure the opportunities to identify new science and innovations.

Report Authors (in alphabetical order by family/last name)

Julia Ah-Reum An
Sudip Ale Magar
Alvaro Alonso-Garbayo
Ajantha A/p Segarmurthy
Francis Ayomoh
Momodou Cham
Aileen Espina
Danny Gotto
Lisa R. Hirschhorn
May Thwel Hla Shwe
Khin Thu Htet
Anna Kennedy
June-Ho Kim
Afeez Lawal
Naeem Majeed
Tafazdwa Ngorima
Hassan Semlali
Victoria Adubia Twum