PHASA NEWSLETTER

The Pulse

October 2018 - Edition 4

Left: Artwork titled: “the Plague Doctor by Zin V”

From the Desk of Dr ANDRÉ ROSE PHASA President

In this edition of the Pulse we explore the importance of epidemiology as the building block of public health. The editorial explores aspects of the history of the discipline.

The articles delve into the establishment and accreditation of epidemiology in South Africa and explore environmental and radiation epidemiology as niched areas in the field.

Person, Place and Time

From the Editors Desk

The foundations of public health are rooted in the discipline of epidemiology. Epidemiology is the study of the pattern of a disease, who it occurs in and the reasons for its occurrence. It uses specific techniques for collecting, analysing, interpreting and applying data to understand disease outcomes in a population at risk and to mitigate for change.

Disease and illness and death have always been intergyral to our understanding of the meaning of life. It has been an ongoing battle that we have waged in order to preserve and extend our longevity. Hippocrates is known as the father of western medicine and the first epidemiologist. He described disease in a rationale way rather than trying to understand it based on supernatural phenomena. Hippocrates believed that illness was cured by restoring the balance within the body. He contributed to understanding the cause of disease based on observations on how disease affected populations and the relations between time and environment. These principles continue to underpin epidemiology today.

James Lind (1716-1794) helped understand why sailors were becoming sick from scurvy. Benjamin Jesty helped paved the pave the way for Edward Jenner (1749-1823) to understand why dairymaids were not contracting smallpox and laid the understanding for vaccinology. This resulted in the elimination of smallpox in the 1970s. In the mid 1800s Ignaz Semmelweis identified that handwashing was crucial to control mortality rates in a maternity ward. His simple intervention of washing hands between patients dramatically reduced mortality. In 1853 a large cholera outbreak in London allowed John Snow (1813-1858) to pave the way for modern epidemiological approaches. Louis Pasteur (1822-1895) and Robert Koch (1843-1910) continued to build on the successes of understanding the cause and pattern of diseases. John Graunt (1620-1674) made major contributions to population record keeping and vital statistics. Bernardio Ramazzini (1633-1714) described how occupation was related to the health of workers and laid the foundation for modern occupational health and epidemiology. The growing understanding of epidemiology helped to localise the typhoid fever epidemic in the USA in the 1900s to Mary Mallon (Typhoid Mary) an Irish cook. Stories similar to this are stacked one upon the other like bricks in a wall and construct the picture of the development and advances of modern day epidemiology.

Infectious diseases epidemiology has made major contributions to aid us in understanding how diseases pattern themselves and for establishing the epidemiological practices and processes that shape the discipline today. The epidemiological transition has shifted the burden of disease from communicable to non-communicable diseases. The surge in diabetes, obesity, cancer and mental illness offer prospects to better understand how these public health challenges will shape the future of humanity's morbidity and mortality. An infectious disease like HIV poses a unique challenges in that it is a chronic infection, which to date has no cure, and is being regarded as a chronic disease. Climatic and environmental conditions bring additional challenges that affect populations across national borders.

The use of genomics to understand outbreaks and epidemics offers an exciting opportunity to more precisely understand the cause and source of an outbreak. Advances in the field allows precise conclusions to be drawn about the causative agent for an outbreak and to localise the source of the infection. Based on the genetics of an organism various outbreaks can be linked to a common source with certainty. The recent Listeriosis outbreak in South Africa is an example of the valuable role genomics has played in pinpointing the source of the epidemic. Advances in telecommunication has facilitated collaboration and allows for instantaneous communication across the global. This has assisted to curb potentially catastrophic global events.

Public health challenges pepper the health-scape in South Africa. Crucial to their control is understanding the communities they affect, the factors that drive these challenges and what can be done to mitigate their effects. Epidemiology is crucial to this mitigation process. There is however a paucity of trained epidemiologists in South Africa. Epidemiology should be part of the human resources for health planning for the country. Furthermore, the continued practice of employing ill equipped professionals into positions that should be held by trained epidemiologists needs to be stopped. There has to be a deliberate and concerted effort to recognise the worth this disciple offers to the control of public health challenges in South Africa. Definitive career pathing has to be established especially within the national and provincial departments of health with in the country.

In this edition Reddy discusses the importance of having epidemiology programs accredited. He deliberates how the National Institute of Communicable Diseases' Field Epidemiology Training Programme aims to be an accredited programme that establishes the value and relevance of the discipline in addressing public health challenges. Ravhuhali asks the critical question if we are building the epidemiology capacity within South Africa quick enough to meet the health challenges. Pasqual explores the niched area of radiation epidemiology and discusses how radiation affects our well-being. Dalvie unpacks the importance of environmental epidemiology in understanding public health challenges.

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INTRODUCTION TO EPIDEMIOLOGY

https://www.bmj.com/about-bmj/resources-readers/publications/epidemiology-uninitiated/1-what-epidemiology
https://goo.gl/kMzRce

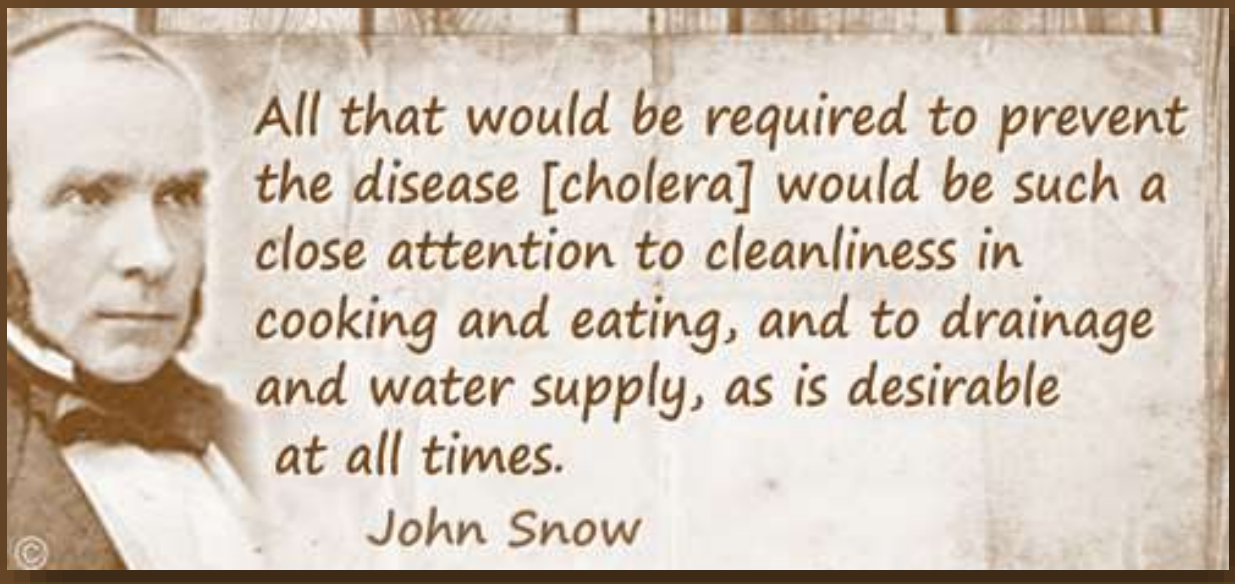
TOOLS FOR LEARNING EPI:

http://news.emory.edu/stories/2015/06/SOPH_professor_develops_teaching_website/
http://activepi.herokuapp.com/

EPIDEMIOLOGY RESOURCES:

http://www.who.int/violence_injury_prevention/resources/res17/en/http://www.epidemiolog.net/resources/onthenet.htm

QUOTE BY JOHN SNOW



DOES ACCREDITATION MATTER?

Dr Carl Reddy
SA Field Epidemiology Training Programme
National Institute of Communicable Diseases

The South African Field Epidemiology Training Programme (SAFETP) – the only two-year residential field epidemiology training programme in South Africa - decided to apply to the Training Programmes in Epidemiology and Public Health Interventions Network (TEPHINET) for accreditation in late 2017. This set in motion a series of commitments and deadlines for the programme staff. In retrospect, it also created a space for conversations and introspection on the value of the programme and its relevance.

During the 2017 accreditation cycle - three FETPs in the African region had applied for and been accredited - Cameroon, Kenya and Zimbabwe. We viewed TEPHINET accreditation as an opportunity for our programme to align with common standards that support quality training and increase recognition of our efforts in developing a public health workforce capable of detecting and responding to health threats.

Overall, accreditation is viewed by the global network as an opportunity to better align with the World Health Organization (WHO) priorities and some common values that can help programmes increase recognition and prestige as well as be a valuable resource to support specific country public health priorities.

TEPHINET's Accreditation Programme:

A. Participants in the process of Accreditation

Together with applicant country FETPs, the following groups are participants in the process:

1. Accreditation Working Group
   Provides technical guidance and leadership to continually develop and improve the quality of the accreditation process.
2. Accreditation Review Team
   Reviews accreditation application and conducts site visits.
3. Global Accreditation Body
   Makes the final determination of an FETP's accreditation status.
4. TEPHINET Secretariat
   Provides logistical support and manages the accreditation process.

B. Setting the Global Standard for Quality Training in Applied Epidemiology

While the general FETP model is based on the CDC's Epidemic Intelligence Service, the structure and curriculum of each FETP around the world can vary significantly according to the needs of the country and the resources available for programme development.

There has, however, been recognition of the need for a common set of standards for field epidemiology training around the world to produce the most qualified graduates. The process and standards for accreditation were developed over a five-year period with input from TEPHINET's global network of FETPs and partners. The *"Accreditation of FETPs Minimum Indicators and Standards"* is the framework developed by TEPHINET programmes to recognise the minimum attributes of a FETP. The indicators and standards are now the official accreditation standards.

The accreditation criteria are organised in two sections: the first lists the three basic accreditation eligibility requirements, and the second corresponds to the accreditation indicators and standards which are grouped in four domains that define program infrastructure, management, resources and training of residents. The domains are organised by major indicators which in turn might have one or several standards.

Steps to Accreditation:

1. Programme completes the Accreditation Readiness Assessment.
2. Programme submits a Letter of Intent and Certification of Eligibility to TEPHINET.
3. Eligible programmes are invited by TEPHINET to complete the full application.
4. Programmes complete, and submit to TEPHINET, the full application by 31 May 2018.
5. Accreditation Review Teams assess each application.
6. Accreditation Review Teams conduct programme site visits for select programmes based on the reviewers' joint assessment of the application.
7. The Global Accrediting Body reviews the ART recommendation and makes the final accreditation decision.

The SAFETP successfully completed steps 1 to 5 above. Dr Wences Arvelo and Dr George Schmid from the US CDC in Atlanta conducted a programme site visit from the 19th to 25th August 2018 and their site visit report recommends that the SAFETP be accredited. We are still to receive questions from the GAB and they will make the final accreditation decision in mid-November. In the intensive process of assessing our own alignment with the accreditation standards and compiling an electronic and hard copy dossier of evidence of our policies, processes and activities, we were able to identify areas for improvement and we questioned some of the ways we were accustomed to do things. As a result, we decided to do an impact evaluation of the SAFETP given that it is 10 years old and that such an evaluation had not been done before. The draft report of this impact evaluation is due in October 2018.

The probing questions of the reviewers particularly with regard to ownership and sustainability of the programme prompted the team to rethink many of our budgetary assumptions in a quest for efficiency gains for subsequent financial years. In summary, the process of applying for accreditation has had many positive spinoffs including a renewed faith in the value of our efforts, better team work and a higher programme profile.

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BUILDING EPIDEMIOLOGY CAPACITY IN SOUTH AFRICA - ARE WE MOVING FAST ENOUGH?

Mr Khuliso Ravhuhali
Field Epidemiologist
South African Field Epidemiology Training Programme (SAFETP)

This article describes the efforts made to build epidemiology capacity in South Africa's health system to contribute public health workforce development.

South Africa has an urgent and unmet need to develop and deploy epidemiologists and staff with epidemiology competencies in the public health sector. Following the World Health Organization Joint External Evaluation of International Health Regulations core competencies in November 2017, it was noted that there is a limited number of health professional specialists at national and provincial levels with competencies in surveillance and epidemiology in South Africa. The IHR and the Global Health Security Agenda calls for sufficient field epidemiologic capacity in every country to rapidly detect, respond to, and contain public health emergencies, thereby ensuring global health security. The IHR propose an optimal target of one trained field epidemiologist (or equivalent) per 200,000 population. Based on this proposed target, South Africa requires at least 280 active field epidemiologists for its population of 56 million. We currently do not know how many epidemiologists are trained and function as dedicated field epidemiologists in the country.

South Africa has well-established postgraduate courses in public health and among them is the South Africa Field Epidemiology Training Programme (SAFETP). SAFETP was formed in partnership with National Department of Health (NDoH), National Institute for Communicable Diseases (NICD), the National Health Laboratory Services (NHLS), the US Centers for Disease Control and Prevention, the University of Pretoria and recently the University of the Witwatersrand. The goal of SAFETP is to develop competent field epidemiologists who can assume public health positions while strengthening countries' outbreak response capacity, public health surveillance systems and use of data to inform prevention and control measures for priority public health problems. SAFETP trainees conduct surveillance activities and outbreak investigations in service to the Department of Health. The activities are aimed at strengthening the prevention and control of infectious diseases of global health importance.

In 2012 South Africa developed a robust strategy for human resources for health to "implement a re-engineered primary healthcare service and ensure the service capacity for a health system with improved financing through national health insurance". The strategy recognised the need to "develop and employ new professionals and cadres to meet policy and health needs". There were recognised gaps in the area of public health surveillance and response medicine and how we respond to this.

SAFETP held a workshop at the Public Health Association South Africa (PHASA) conference 2012. The workshop identified a need to build epidemiology capacity in South Africa's public health system. The question raised was the "how", taking into account three areas: 1) pre-service; 2) in -service in existing structures and 3) entrenchment – having epidemiology as a formal discipline in the health service. The PHASA Epidemiology Special Interest Group (SIG) pursued some of the activities of the Epidemiology Working Group such as:

- Reviewing a rapid appraisal of current epidemiology training in SA;
- Exploring different models of best practice in building epidemiology capacity; and
- Determine what epidemiology competencies are required by various cadres of Health Care Workers.

In September 2017, the NDoH and the NICD undertook an epidemiological landscape assessment which found that the norms for epidemiology in South Africa had not been established, and recommended "further definition and elaboration of the current production and use of epidemiologists and those cadres with epidemiology competencies in the government public health sector". The working group continued consultations with the NDoH which led to the development of a draft occupational framework for epidemiology in the public health sector and cadre-appropriate competencies in epidemiology.

Progress has been slow. However, in the context of developing an action plan for a comprehensive workforce strategy as required by the IHR, we have the opportunity to position public health and epidemiology specifically as an essential discipline required to bring data intelligence to inform prevention and control measures for priority public health problems.

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Academics attending the Inaugural Lecture are encouraged to be in their academic regalia and to partake in the academic procession

NOTHING IN LIFE IS TO BE FEARED, IT IS ONLY TO BE UNDERSTOOD.

Dr Elisa Pasqual
Barcelona Institute for Global Health (ISGlobal), Barcelona, Spain
Universitat Pompeu Fabra (UPF), Barcelona, Spain

Radiation, as many major scientific findings, was discovered almost by chance. In all probability, early radiation scientists weren't imaging how such a discovery would shaped history. Today, as public health experts, we may be interested in this story as an opportunity to reflect upon the role of epidemiology in public health.

Radiation was discovered at the beginning of the 20th century. Soon, many industries became interested, foreseeing a high applicability in society. Cosmeticians and clock makers were interested in luminescence, a property of radioactive materials. Cosmetic products enriched with radium were sold promising a bright and ever-young skin. A special paint, enriched with radium was patented in 1903 and used to produce "radio-luminescent clocks". At that time, radiation was not suspected to be harmful; instead, it was thought to be a sort of lifelong elixir. The pharmaceutical industry started to sell radioactive products as the "panacea" of many diseases. At the same time, first observations that radiation could also kill cancer cells pushed Marie Curie to promote cancer treatment with radium (called "Curie-therapy"). During the same period the first x-ray diagnostic equipment started to be used.

As radiation was used by different industries, workers began to raise concerns regarding the potential adverse effects of radiation. One of the first groups that questioned radiation safety was a group of young women. They were employed at the United States Radium Corporation in New Jersey as radium dial painters. Because precision was required, they were taught to lick the paint-brush. A few became ill, suffering from mandible necrosis, dental infection, bone fractures, anemia (radium tends to accumulate in bone) and some died very young. The radium contained in the paint was suspected to be the cause of such diseases; however a proper public health approach was delayed because of conflicts of interest and the economic crisis. Marie Curie was asked to provide her opinion but she was initially reluctant to consider the radium, her invention, as the cause of such conditions. In parallel, dermatitis, cases of skin carcinoma and hematological lesions were documented among healthcare workers working with x-ray equipment. The same scientists that were experimenting with radiation also started to suffer skin and hematological lesions. In 1934 Marie Curie died of aplastic anemia.

Society started to change its attitude towards radiation. Throughout the century major events occurred that contributed to the spread fear and concerns about radiation. In 1945, the atomic bombs were dropped in Hiroshima and Nagasaki, causing unprecedented devastation and radiation related health effects that are still being observed today. Major environmental radiation disasters (Chernobyl, Techa-River and Fukushim) also occurred and impacted on the life of millions of people.

Meanwhile, the question of whether radiation can cause adverse health effects started to be properly scientifically addressed. Large studies were set up in different exposure settings: occupational (radiologists, miners, nuclear workers, atomic veterans), medical (patients treated with radiotherapy, exposed to diagnostic x-rays) and environmental (atomic bomb survivors, nuclear-weapons fallout, Techa-Rive and Chernobyl). A joint effort between epidemiologists, dosimetrists, statisticians and biologists resulted in advancing the methodology towards providing radiation risk estimates and defining dose-response relationships. In parallel to advances in epidemiology, awareness related to radiation safety grew and it was finally translated into radiation protection protocols and guidelines.

Today, the use of radiation is much more widespread than in the early 1900s but there are still many public health related questions that need to be answered and new challenges that need to be tackled. The use of radiation in medicine is one of these. Thanks to the introduction of radiation, diagnostic and therapeutic approaches have improved dramatically, resulting in major improvements in patient care. However, medical radiation has become the largest man-made source of exposure to ionising radiation for the general population. Such a growing source of exposure represents a double challenge for radiation epidemiology.

The first is a scientific challenge: risk estimation at very low doses (such as that typically delivered in medical settings) requires large epidemiological studies (of the order of 1 million individuals) to ensure sufficient statistical power. To date, direct risk estimates at this low dose level have not been well characterised. The second challenge is a public health matter: from an individual point of view, undergoing an examination represents a benefit (improved clinical care) and a minimal risk, because the dose levels are low. However, from a population point of view, even a small risk can result in an increased number of cancer cases (or other chronic diseases) if the exposed population is large. Thus, we should promote actions that aim to reduce population exposure without compromising individual clinical benefits.

The ultimate challenge for radiation epidemiology is the challenge of any science: promoting culture to contrast irrational attitudes by inspiring confidence in the knowledge. Marie Curie said: “Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.”

The Importance of Environmental Epidemiology in Public Health.

Dr Mohamed Aqiel Dalvie
Centre for Environmental and Occupational Health Research, School of Public Health and Family Medicine, University of Cape Town.
CIBER Epidemiología y Salud Pública

Globally, the health impacts due to environmental exposures are very significant public health problems with environmental factors responsible for about 25% of the global burden of disease. The environmental burden of disease in sub-Saharan Africa is particularly high with environmental exposures aggravated by poverty and affecting vulnerable and environmentally marginalised communities. Improvement in environmental health has been shown to be crucial and a sustainable way of eliminating poverty. The lack of environmental health data in Africa, which is undergoing rapid development and high potential exposures amongst environmentally marginalised communities, make research in this setting a priority. Environmental epidemiology – which concerns the determination of the incidence and prevalence of disease and death caused by environmental exposures – is therefore very important.

The major environmental exposures globally, regionally and locally in South Africa were identified by the Word Health Organisation in its recent global assessment include indoor and outdoor air pollution, water pollution, ultraviolet radiation, the workplace, agriculture and climate change. These exposures should therefore be the focus of environmental epidemiology. Children, the elderly and those living in low- and middle-income countries have been identified as the most at risk. The contribution of non-communicable diseases to the burden resulting from these exposures has increased significantly over the past decade.

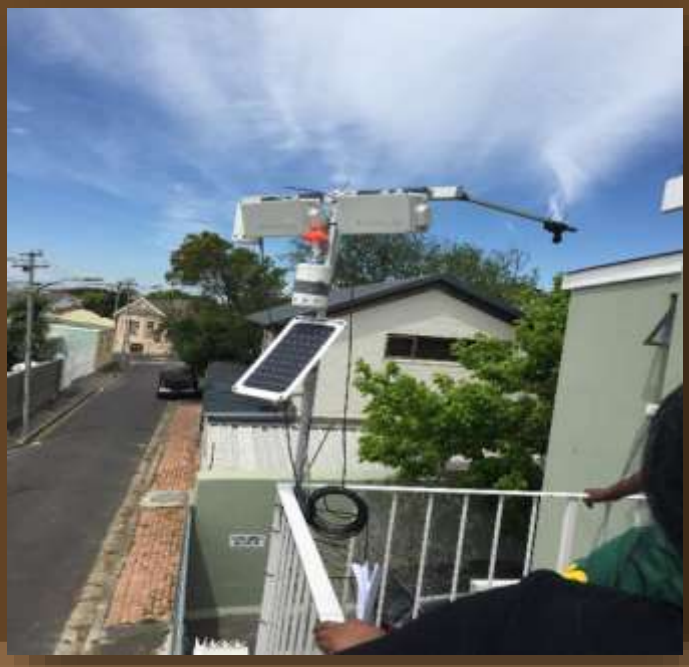
There are still large research gaps in the understanding of the epidemiology related to outdoor chemical air pollutants such as particulate matter, nitrogen oxides, carbon monoxide, sulfur dioxide, ozone and lead release from industry and/or traffic on health. An important example in South Africa are the health effects resulting from the collective pollution of coal fired power stations in Mpumalanga's Highveld. Diseases resulting from these exposures makes a large contribution to the global burden and include stroke, ischaemic heart disease, lower respiratory tract infection, cancers, chronic obstructive pulmonary disease and neurotoxicity. The knowledge of the impacts of these chemicals at levels below international exposure standards is particularly limited. There is little data on the impact of biological outdoor air pollutants such as pollen and fungal spores on respiratory health and this is an important emerging topic in environmental epidemiology.

The epidemiology of indoor air pollution is complex due to multiple possible exposures that can occur in a confined space. Important questions to be investigated in this area are how the use of biomass fuels for indoor cooking and heating in developing countries impact respiratory health, how the household use of chemicals such as those used for cleaning and pest control impact health, and how exposure to microbiological organisms from mould and exposure to radon affect health.

The quality of surface and groundwater resources and soil in low- and middle-income countries are deteriorating due to sewage disposal, chemical discharges resulting from industrial activity, human settlements and agriculture. Interventions that improve water quality are a high priority. Microbial pollution of water resources particularly due to poor water supply and inadequate sanitation in developing countries is a major contributor to the environmental burden of disease in low- and middle-income countries. The understanding of risk factors for diarrhoeal diseases and the effective control of these exposures is crucial in these settings. Additionally, the re-emergence of neglected tropical diseases is an important public health problem. Health impacts due to chemical water pollution, such as toxic metals from mining and pesticides used in agriculture, is also a significant public health issue. For instance, many contemporary pesticides are endocrine disruptors which can disrupt physiological processes potentially resulting in adverse effects on reproduction, neurobehavioral effects, have negative impacts on the thyroid system and trigger obesity.

The major determinants of the environmental burden of disease are sensitive to climate change and the impact on developing countries is higher due to weak infrastructure and mitigation strategies. It is therefore imperative for current environmental epidemiological research to investigate the exasperation in environmental health impacts resulting from climate change and also the direct effects of climate change such as increased exposure to ultraviolet radiation, heat stress, flooding and droughts.

Multiple exposures, the lack of good quality health monitoring data and data on environmental exposures in developing countries are challenges in conducting environmental epidemiological studies that need to be overcome. This is especially true in the case for investigating the long-term effects of low dose environmental exposures on diseases such as cancer that require a long latency. Another challenge in current environmental epidemiological research is the limitations in investigating the synergistic effects of environmental pollutants. There is also limited research in the understanding of gene-environmental interactions. It is important for future environmental epidemiological research to incorporate advances in scientific research to improve the understanding of the causes of environmental health problems.



Bottom right: (Toyib Olaniyan)

Top Right: (Samuel Fuhrimann)

Above: (Samuel Fuhrimann)

Middle left: (Apolline Saucy)

Below: (Aqiel Dalvie)

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QUOTES ON HUMANITY