



Sinergi Penelitian Dasar dan Terapan untuk Membangun Ketahanan Individu dan Komunitas

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Sebuah pesan dari era *Millennium Development Goals* (MDG) 2001-2015 memasuki era *Sustainable Development Goals* (SDGs) 2015-2030:

No Health without Research

*World Health Report (WHR) 2012

Research occupies a critical position in promoting people's well-being in the knowledge-based era

Indeed, the increased longevity of humans is attributed to advances resulting from medical research:

- *vaccines for preventing many infectious agents,*
- *insulin treatment for diabetes,*
- *antibiotics for bacterial pathogens,*
- *and increasingly successful treatments for cancer and degenerative diseases.*

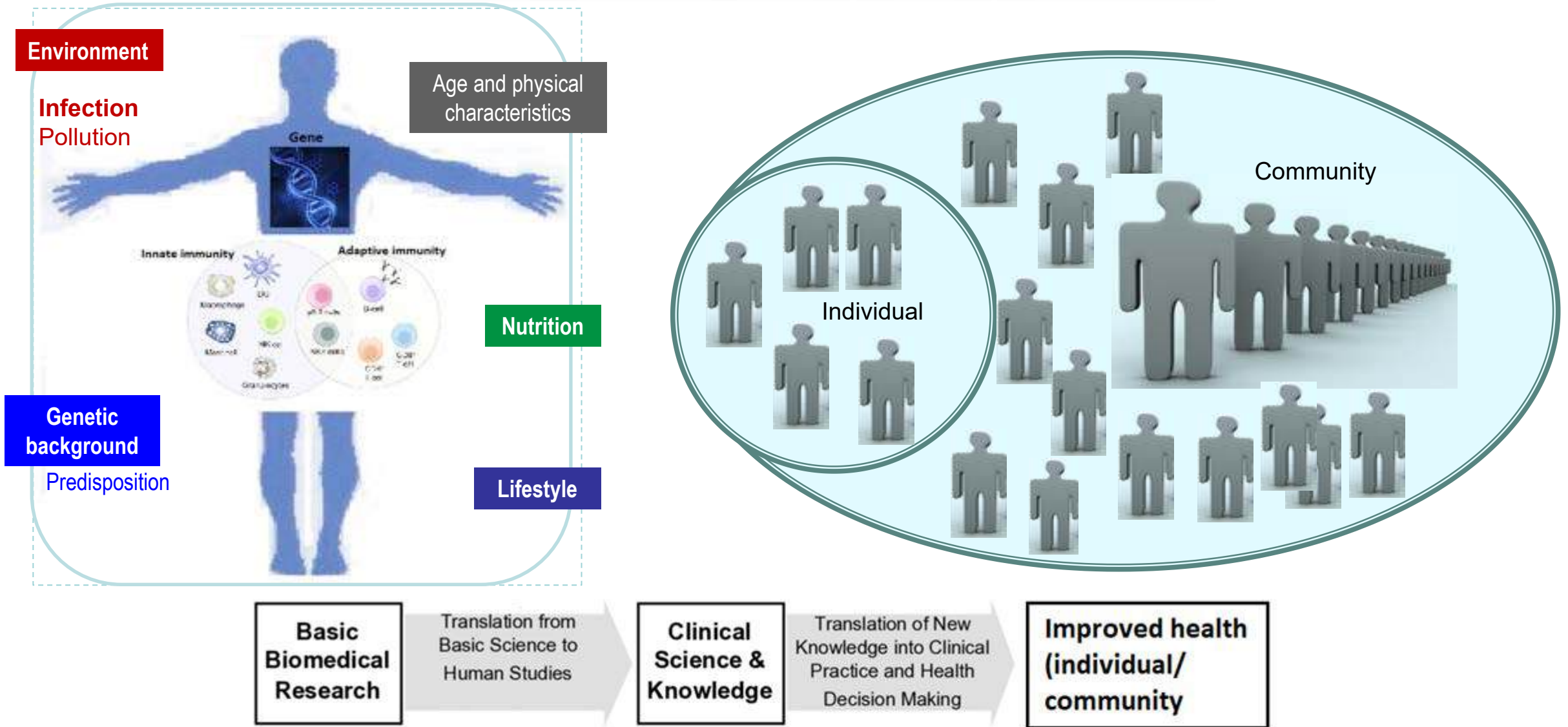
Lesson learnt

HEALTH IN
2015- 2030

from
MDGs
MILLENNIUM
DEVELOPMENT GOALS
to
SDGs
SUSTAINABLE
DEVELOPMENT GOALS

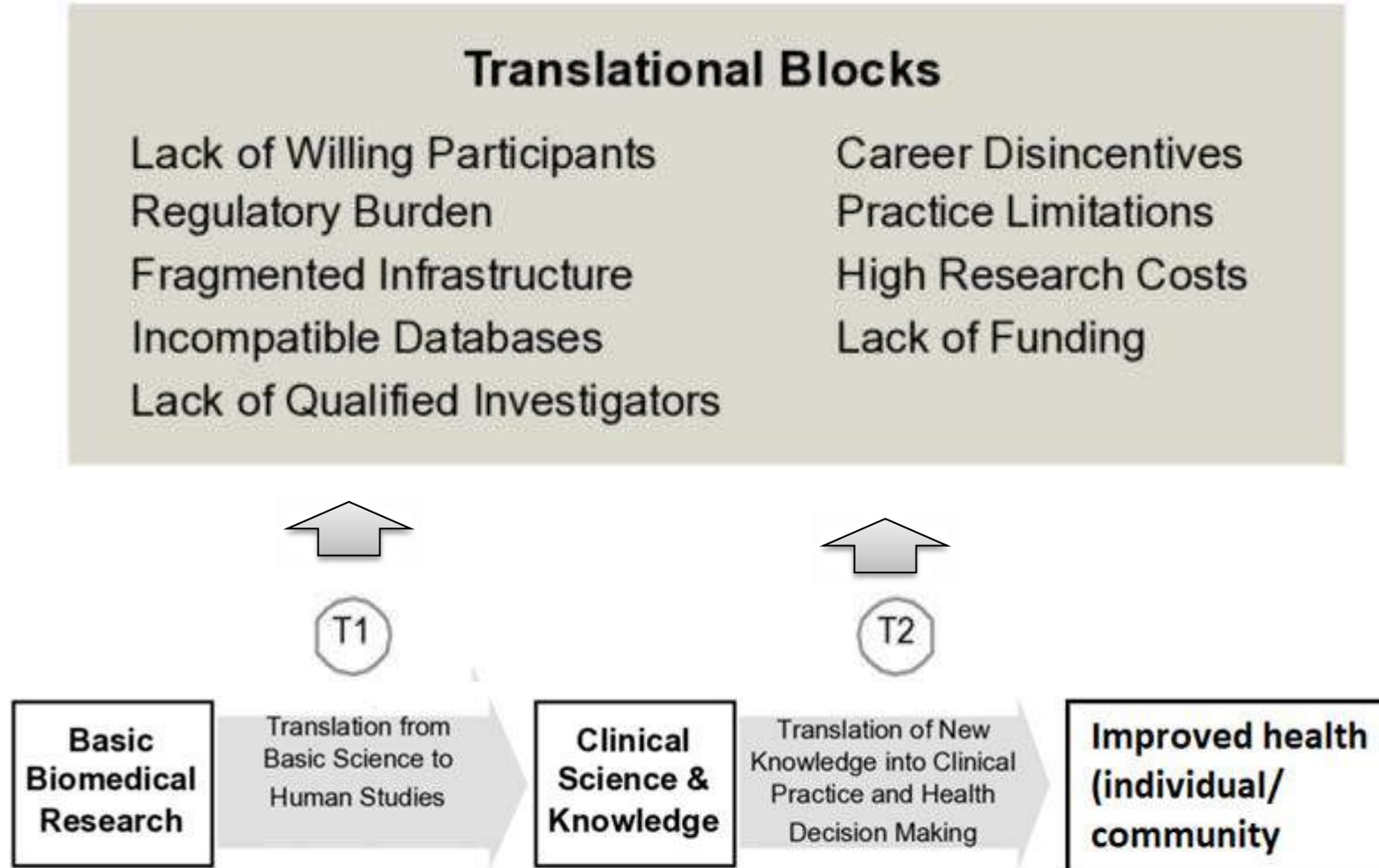


Spektrum penelitian: dasar → klinik → komunitas



RESEARCH CONTINUUM

Hambatan translasi penelitian: dasar → klinik → komunitas



RESEARCH CONTINUUM

Masalah di negara berkembang

- Beban ganda di bidang kesehatan: penyakit menular dan penyakit tidak menular
- Ketidak-seimbangan antara **masalah yang dihadapi** dan **kapasitas mengatasi masalah**, karena kelemahan dalam hal :
 - Penguasaan dan pemanfaatan pengetahuan, teknologi dan materi yang ada
 - Mentranslasikan **hasil penelitian menjadi tindakan**
 - Menciptakan pengetahuan dan cara baru

Negara berkembang perlu membangun **kapasitas riset**:

- Untuk meningkatkan kemampuan melakukan studi sesuai dengan kebutuhan dan karakteristik, dalam konteks negara masing-masing

Problems in developing countries:

- *Have dual burden in health of persisting infectious diseases and growing problem of non-communicable diseases.*
- *A mismatch between this health burden and the human and technical capacity:*
 - *To utilize existing knowledge, technology, and materials*
 - *To translate scientific findings into action, and*
 - *To generate new knowledge and strategy to combat these problems*

It is necessary for developing countries to build indigenous research capability:

- *To generate ability to undertake studies in their own national settings*

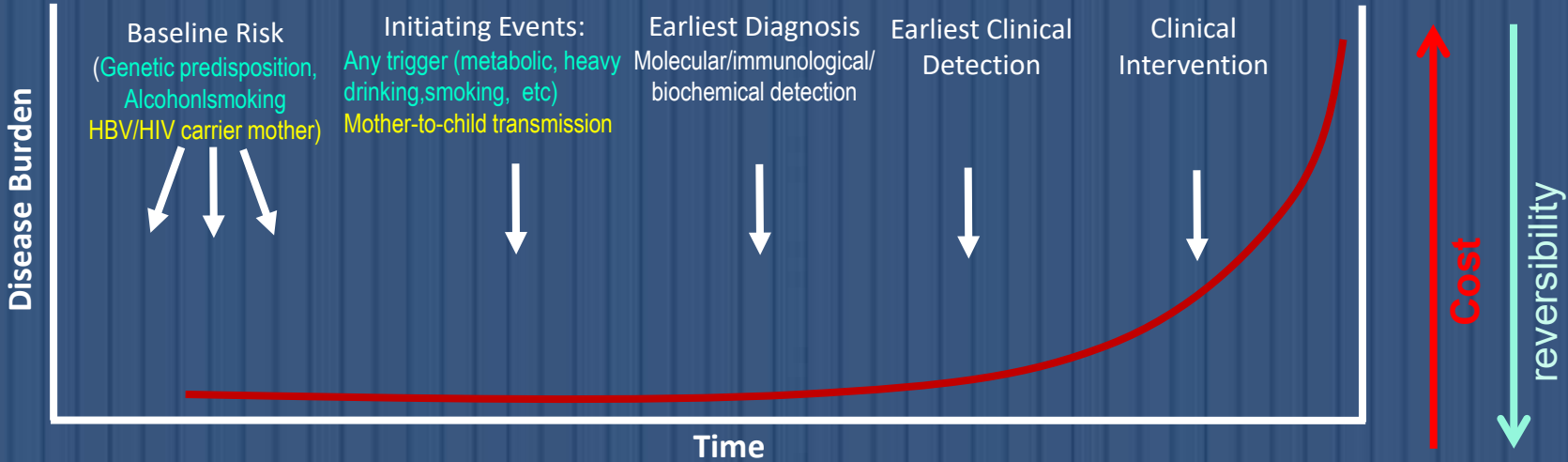
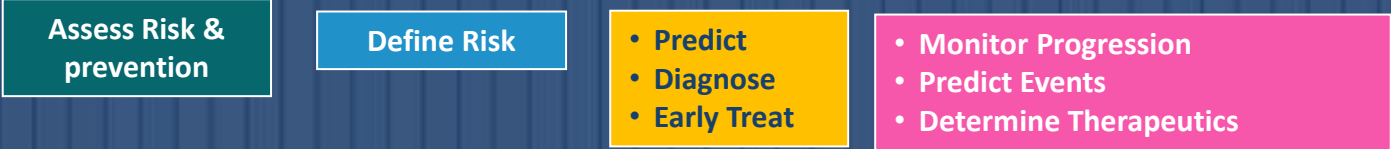
Penelitian dan spektrum penyakit

Research and disease spectrum

Perjalanan penyakit: dari risiko dasar ke manifestasi klinik

Natural Course of Disease: from baseline to clinical manifestation

Decision/
intervention



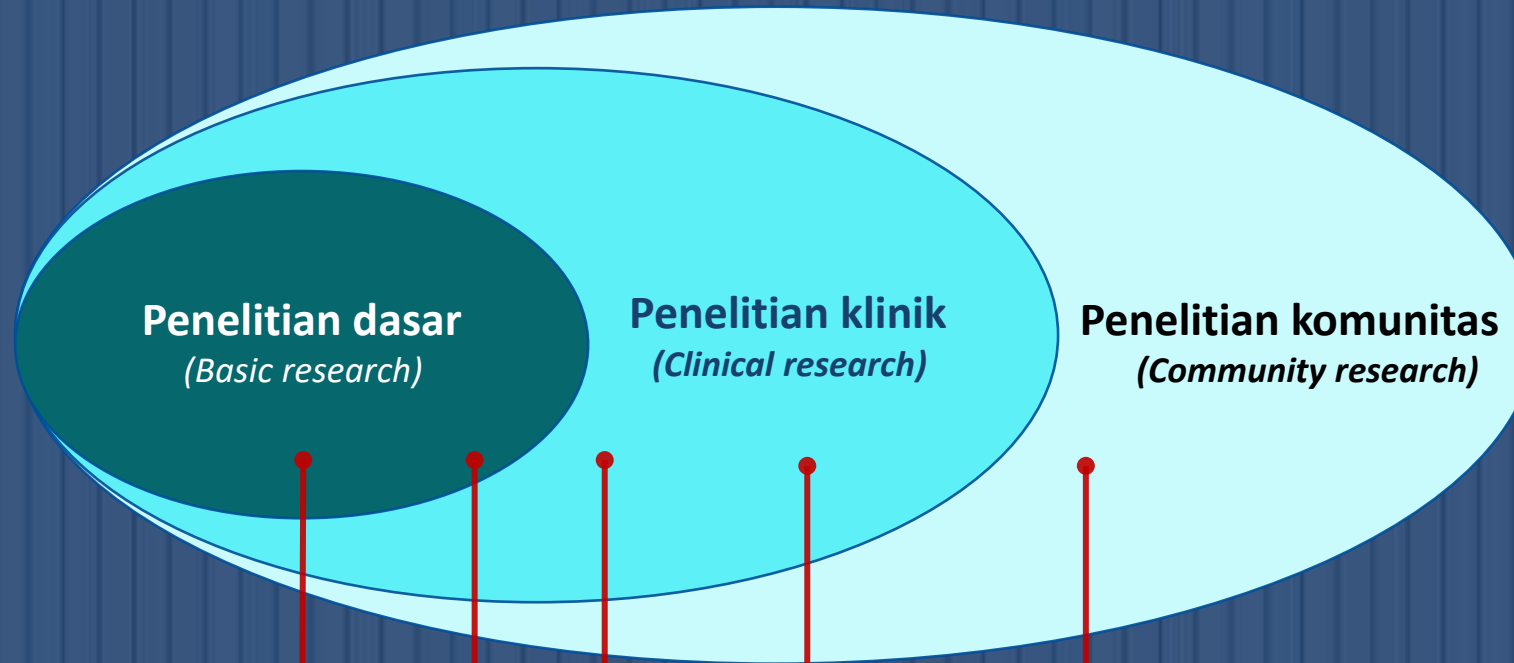
Colour codes:
 • Non-infectious diseases
 • Infectious diseases

Research arena:

Baseline Risk	Preclinical Progression	Disease Initiation and Progression
Genomics Single Nucleotide Polymorphisms (SNPs) Molecular surveillance Gene Sequencing Immunology Epidemiology Prediction for prevention	Gene expression Proteomics & Metabolomics Immunology Surveillance epidemiology Early clinical studies Vaccine development and evaluation Diagnostic & Treatment strategy	Diagnostic improvement Diagnostic & Drug development and evaluation Tool development Clinical studies: Observational & Clinical Trial Treatment protocol & evaluation Health strategy Epidemiology & Disease burden evaluation Control of risk factors

Snyder 2017. The personalized medicine report: Opportunity, Challenges, and the Future

Integrasi dan intensifikasi bidang penelitian untuk memecahkan masalah



Research arena:

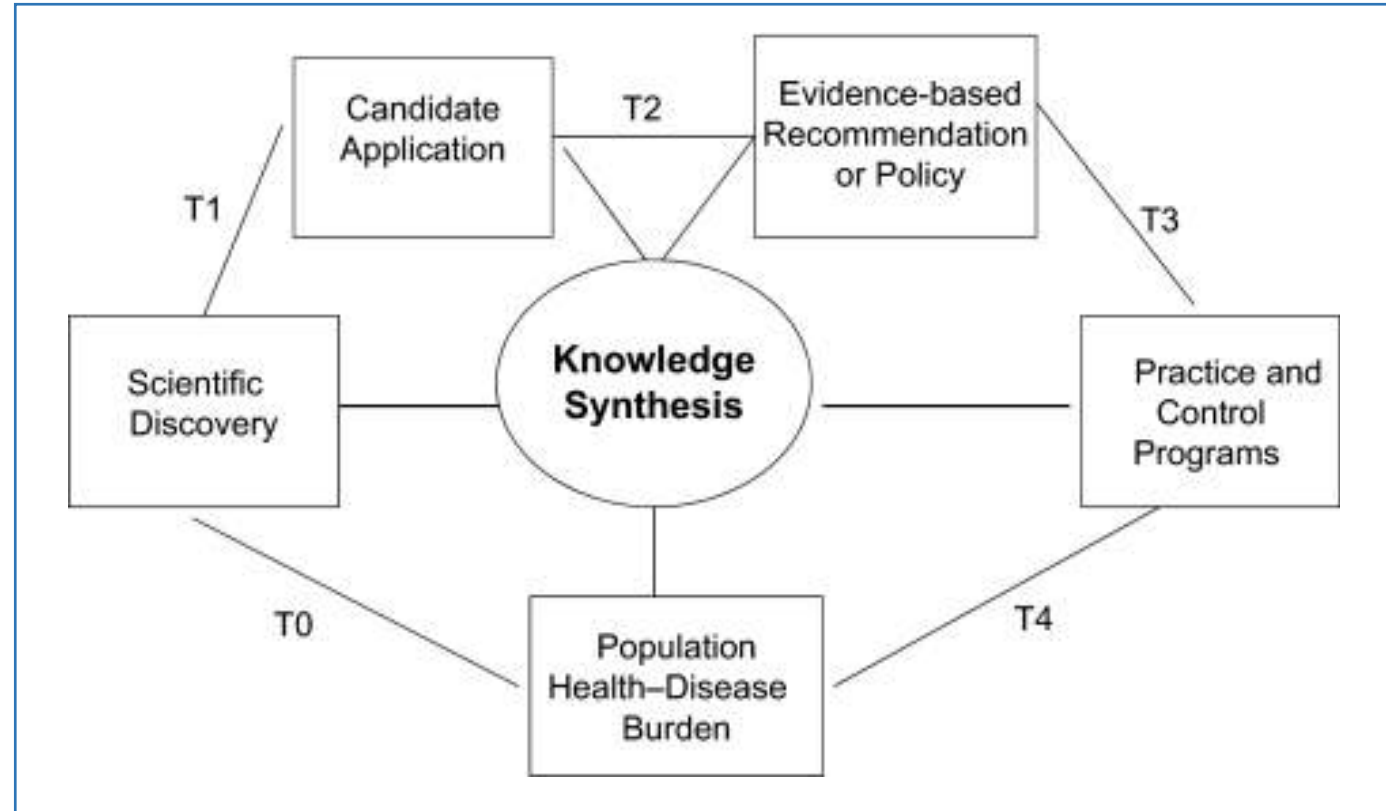
Baseline Risk	Preclinical Progression	Disease Initiation and Progression
Genomics Single Nucleotide Polymorphisms (SNPs) Molecular surveillance Gene Sequencing Immunology Epidemiology Prediction for prevention	Gene expression Proteomics & Metabolomics Immunology Surveillance epidemiology Early clinical studies Vaccine development and evaluation Diagnostic & Treatment strategy	Diagnostic improvement Diagnostic & Drug development and evaluation Tool development Clinical studies: Observational & Clinical Trial Treatment protocol & evaluation Health strategy Epidemiology & Disease burden evaluation Control of risk factors

Rangkaian penelitian:

Dari penelitian dasar ke penelitian terapan

The continuum of basic-to-applied research

Siklus Penelitian:



Masing-masing kelompok penelitian mendalami, menemukan, dan membuka jalan untuk kelompok penelitian berikutnya

a. Tenaga Kesehatan berisiko tinggi terinfeksi virus hepatitis B, dg risiko kanker hati

(b) Insidens kanker payudara meningkat

Breast Cancer Incidence Burden

The number of **incidence cases increased by 128.32%** (95% UI: 109.45–147.49%) from 1990 to 2019, and ASIR showed a slightly increasing trend in this period (EAPC 0.32, 95% CI: 0.27–0.38)



ORIGINAL RESEARCH
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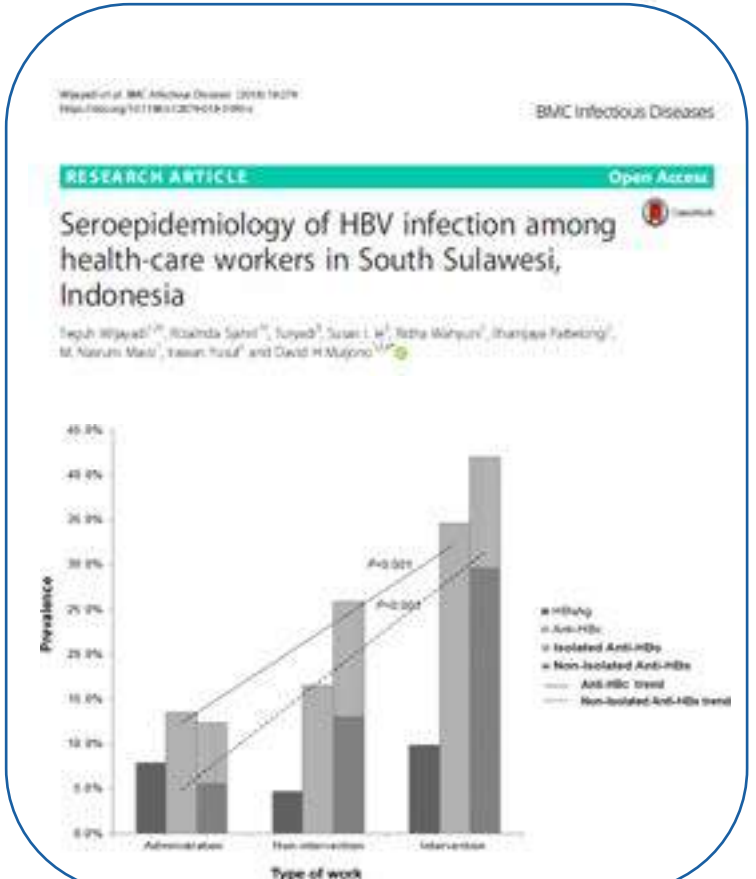
The Global, Regional, and National Burden and Trends of Breast Cancer From 1990 to 2019: Results From the Global Burden of Disease Study 2019

Shangbo Xu¹, Yiyuan Liu^{2,3}, Taofeng Zhang^{2,3}, Jiehua Zhang^{2,3}, Weixun Lin^{2,3}, Jiehui Cai^{2,3}, Jun Zou^{2,3}, Yaokun Chen^{2,3}, Yanna Xie^{4,5}, Yexi Chen^{2,3} and Zhiyang Li^{2*}

Mendapatkan fakta::

Population Health-Disease Burden

1 *Studi klinik/populasi*



Penemuan:

- *Biomarka (penanda genetik)*
- *Pola mutasi*

2

Scientific
Discovery

Mutasi gen S virus hepatitis B
sehingga HBsAg tidak terbentuk
→ risiko 'occult hepatitis B' :

Mutasi gen *basic core promoter*
A1762/T1764 virus hepatitis B
→ risiko sirosis/kanker hati

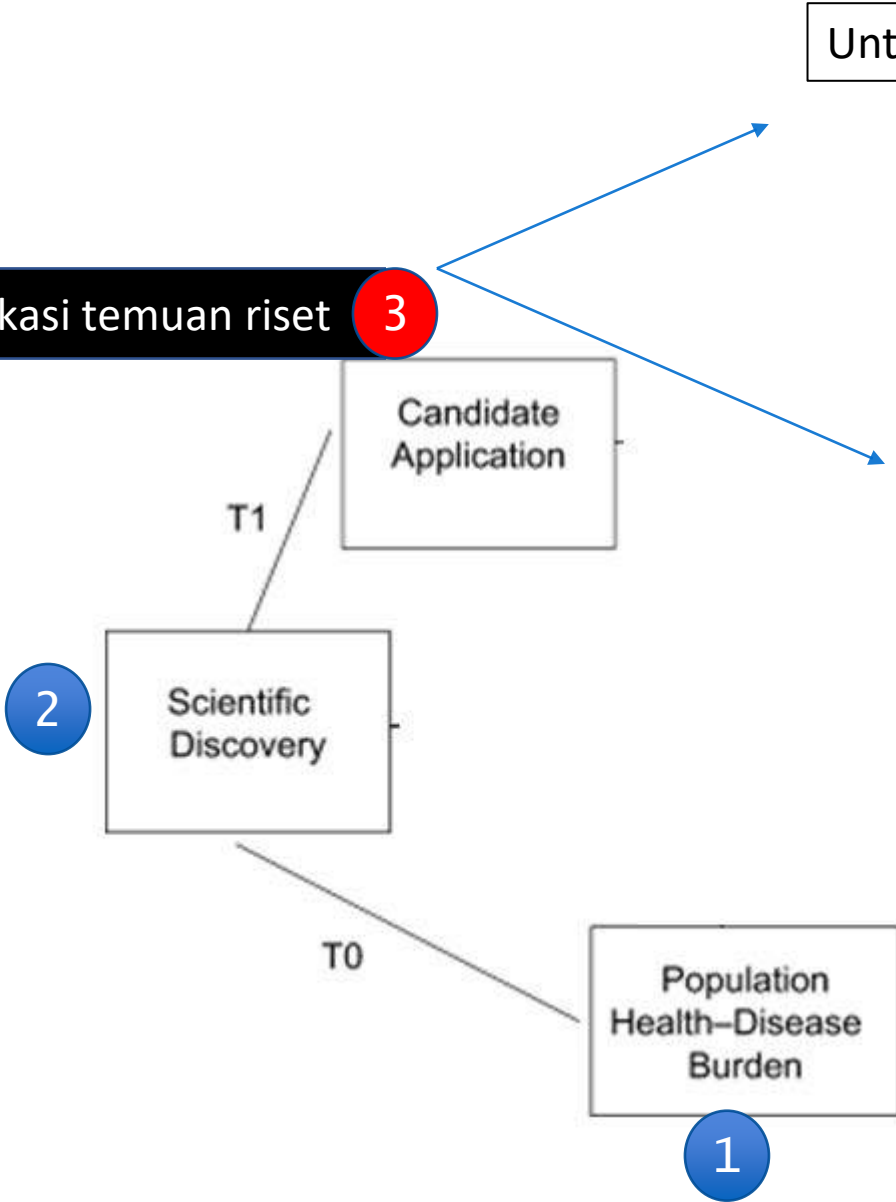
Mutasi gen *BRCA1* or *BRCA2*
pada wanita → Risiko kanker
payudara/ovarium meningkat.

T0

Population
Health-Disease
Burden

Studi klinik/populasi

Aplikasi temuan riset 3

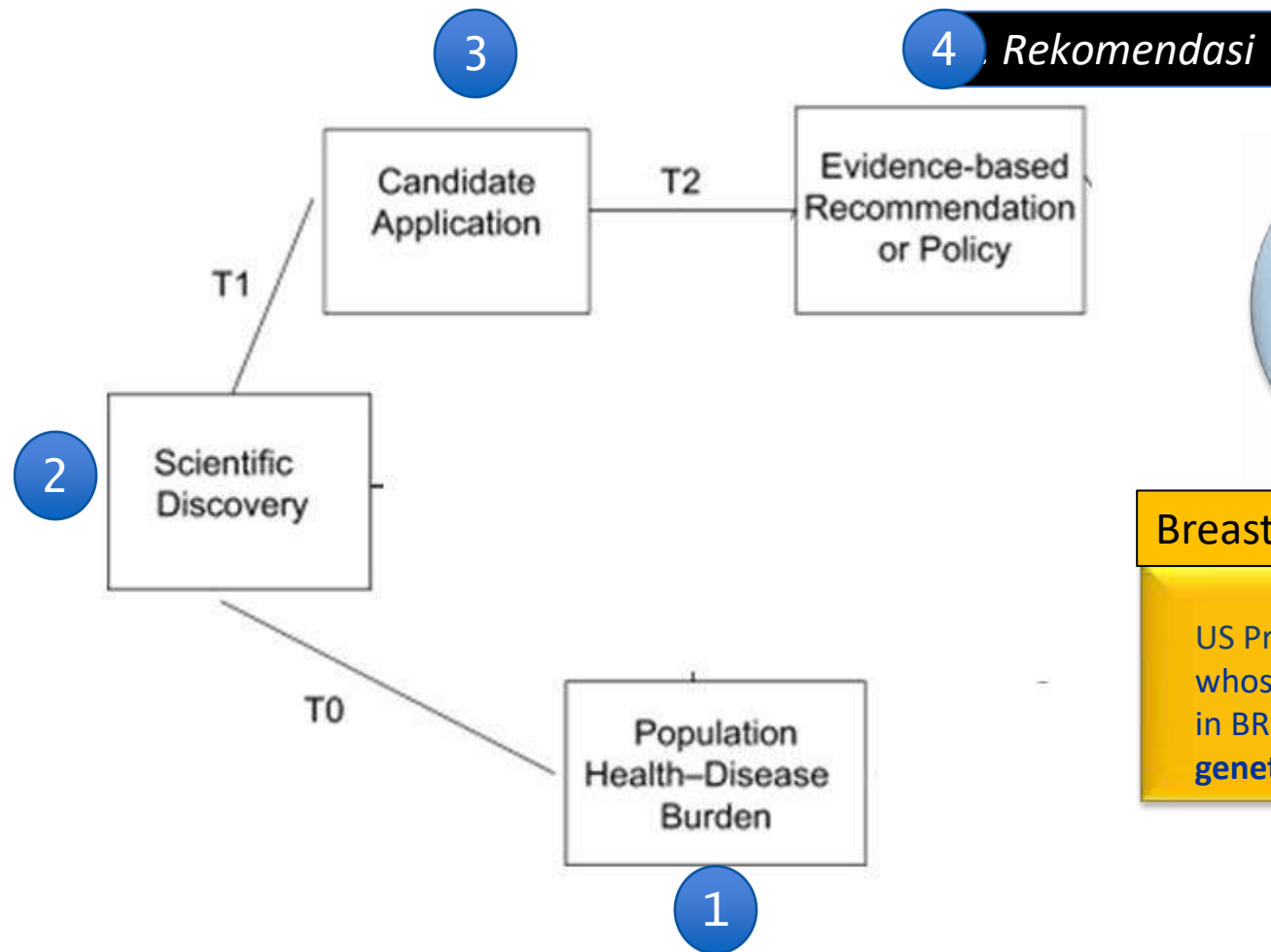


Untuk hepatitis B

Perlu petanda serologi lain: anti-HBc
Perlu test HBV DNA bila anti-HBc positif

Untuk Ca payudara/Ca lain

Some Applications and their intended use			
Disorder/Effect	Test	Target Population	Intended Use
Breast Cancer	CYP2D6	Individuals prior to treatment for BrCa	Treatment with Tamoxifen
Diabetes, Type II	TCF7L2	General population	Risk assessment
Cardiovascular Disease	Multigene panels	General population	Risk prediction; drug or nutritional/lifestyle management
Thrombophilia	F5, F2	Individuals with family history or clinical suspicion of thrombophilia	Prevention and management
Breast Cancer	Gene expression profiles	Women diagnosed with breast cancer	Treatment and recurrence risk
Colorectal Cancer (CRC)	UGT1A1	Individuals diagnosed with CRC	Treatment with Irinotecan
Hereditary Nonpolyposis Colorectal Cancer (HNPCC)	Mismatch repair gene mutations	Individuals diagnosed with CRC and their family members	Management of individuals and early detection/prevention for family members
Depression	CYP450	Individuals diagnosed with depression	Treatment with SSRI drugs
Ovarian Cancer	Genomic Tests	1) General population of women and; 2) women at increased risk for ovarian cancer	Detection and management



Hepatitis B

1. Perlu **pencegahan hepatitis B**
2. Penderita hepatitis B kronik **perlu pemeriksaan core promotor A1762/T1764** dan disarankan mendapat terapi **antivirus**

Breast cancer

US Preventive Services Task Force (2005): “Women whose family history has breast cancer with mutations in BRCA1 or BRCA2 genes **should be referred for genetic counseling and evaluation for BRCA testing**”

She wrote in the New York Times (17 May 2013):

I have always told them not to worry, but the truth is I carry a “faulty” gene, BRCA1, which sharply increases my risk of developing breast cancer and ovarian cancer.

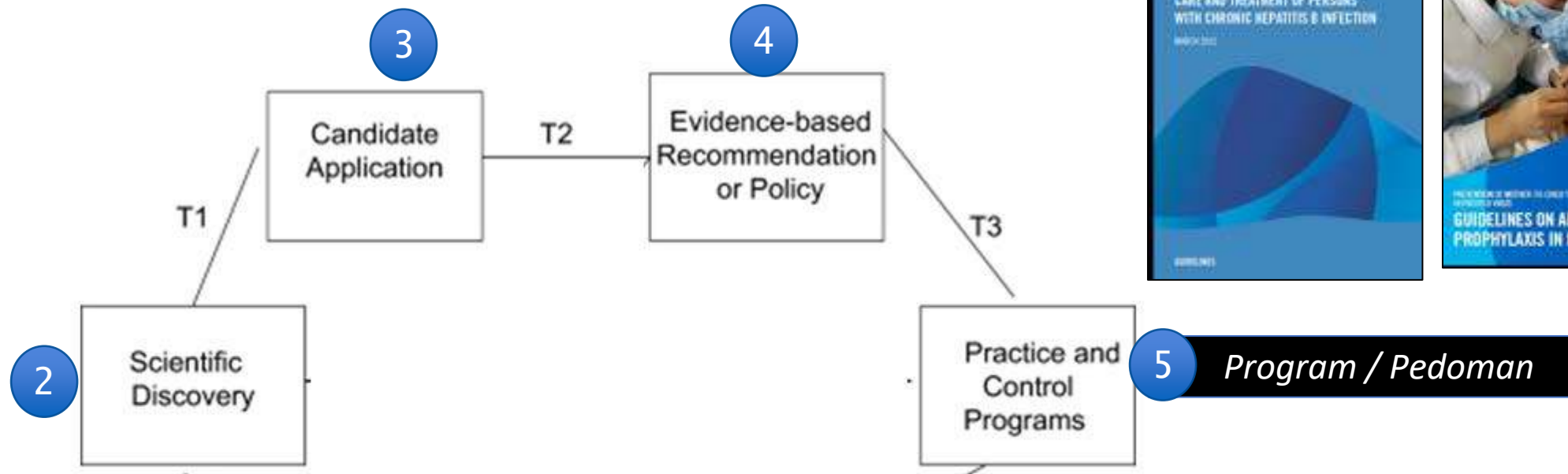
My doctors estimated that I had an 87 percent risk of breast cancer and a 50 percent risk of ovarian cancer, although the risk is different in the case of each woman.

Once I knew that this was my reality, I decided to be proactive and to minimize the risk as much I could. I made a decision to have a preventive double mastectomy. I started with the breasts, as my risk of breast cancer is higher than my risk of ovarian cancer, and the surgery is more complex.

Angelina Jolie Reveals She Recently Underwent Double Mastectomy



Hepatitis B



Breast cancer





ILMU PENGETAHIAN & TEKNOLOGI · CEGAH PENULARAN, WAKSINASI HEPATITIS PADA TENAGA KESEHATAN DIMULAI 2022

PENANGANAN PENYAKIT MENULAR

Cegah Penularan, Vaksinasi Hepatitis pada Tenaga Kesehatan Dimulai 2022

Perlindungan bagi tenaga kesehatan dari risiko penularan hepatitis B perlu diperkuat dengan pemberian vaksinasi. Pemerintah pun berencana menjalankan program vaksinasi bagi semua tenaga kesehatan pada 2022.

Oleh DEONISIA ARLINTA
28 Juli 2021 18:55 WIB · 1 menit baca

A Teks

JAKARTA, KOMPAS — Tenaga kesehatan termasuk kelompok rentan pada penularan hepatitis. Prevalensi infeksi hepatitis, terutama hepatitis B, pada tenaga kesehatan 10 kali lebih besar dibandingkan dengan populasi umum. Karena itu, perlindungan berupa vaksinasi harus diberikan.



GUIDELINES FOR THE PREVENTION, CARE AND TREATMENT OF PERSONS WITH CHRONIC HEPATITIS B INFECTION

MARCH 2015

11.9. Health-care workers *(See also Chapter 10.4: Prevention of hepatitis B and C transmission in health-care settings)*

Health-care workers need special consideration for HBV screening and HBV vaccination; however, this is not widely implemented in LMICs. Those who are HBsAg positive and undertake exposure-prone procedures, such as surgeons, gynaecologists, nurses, phlebotomists, personal care attendants and dentists, should be considered for antiviral therapy to reduce direct transmission to persons. In accordance with 2013 ARV recommendations (16), they should receive a potent antiviral agent with a high barrier to resistance (i.e. entecavir or tenofovir) to reduce levels of HBV DNA ideally to undetectable or at least to <2000 IU/mL, before resuming exposure-prone procedures. Post-exposure prophylaxis should be considered following needlestick or other occupational exposures.

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

A-Z Index

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Morbidity and Mortality Weekly Report (MMWR)

cdc



Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices

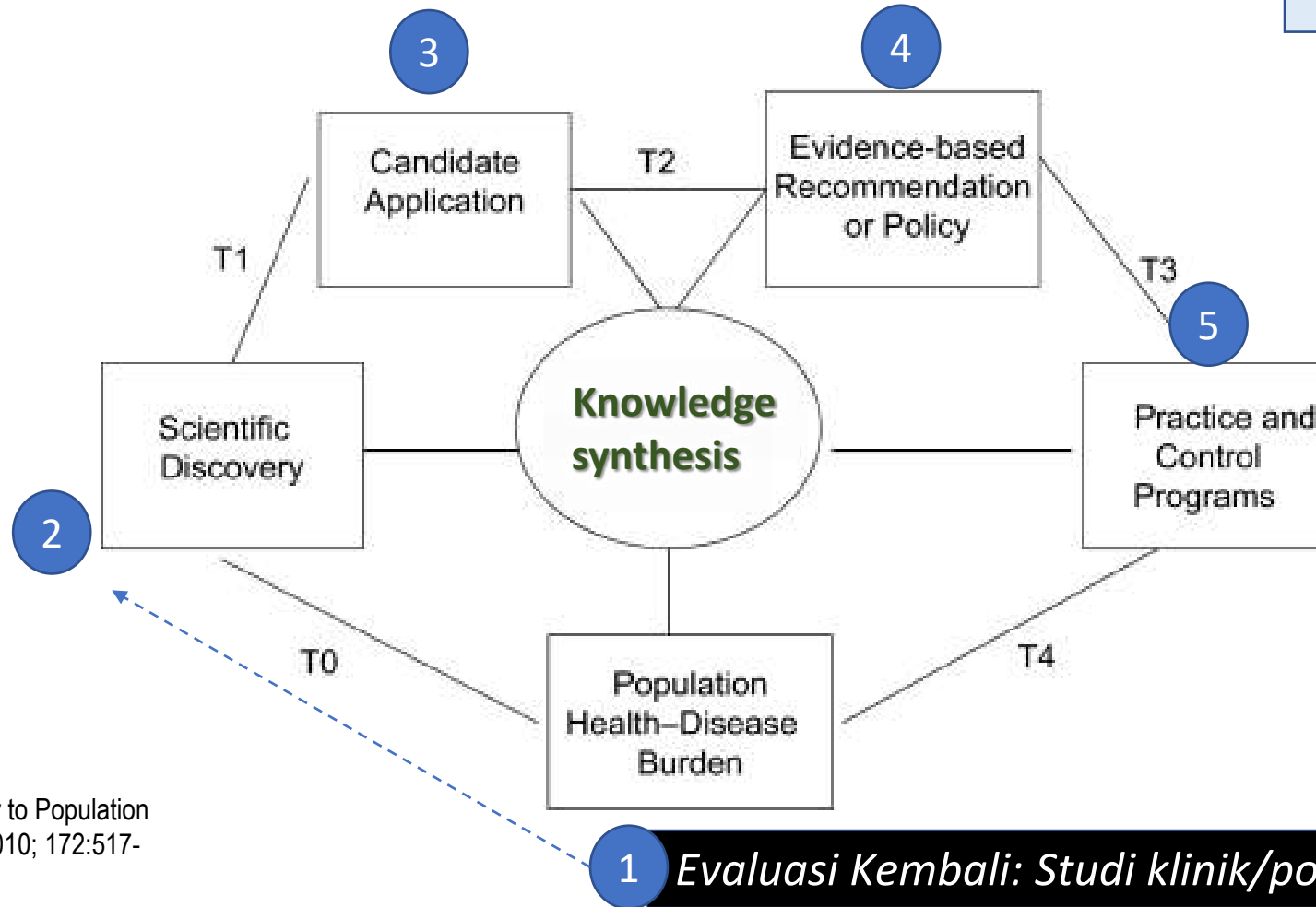
Recommendations and Reports / January 12, 2018 / 67(1):1-31

Sarah Schillie, MD¹; Claudia Vellozzi, MD²; Arthur Reingold, MD²; Aaron Harris, MD²; Penina Haber, MPH²; John W. Ward, MD¹; Noelle P. Nelson, MD¹ [\(View author affiliations\)](#)

Siklus Penelitian:

Sinergi penelitian dasar dan terapan

- Penelitian dasar 2 3
- Penelitian klinik 3 4 5
- Penelitian komunitas 1 2



Khoury. From Scientific Discovery to Population Health Impact. Am J Epidemiol 2010; 172:517-524.

Tiap fase memberikan kontribusi dalam sintesis ilmu pengetahuan
(Each phase gives contributions to Knowledge Synthesis)

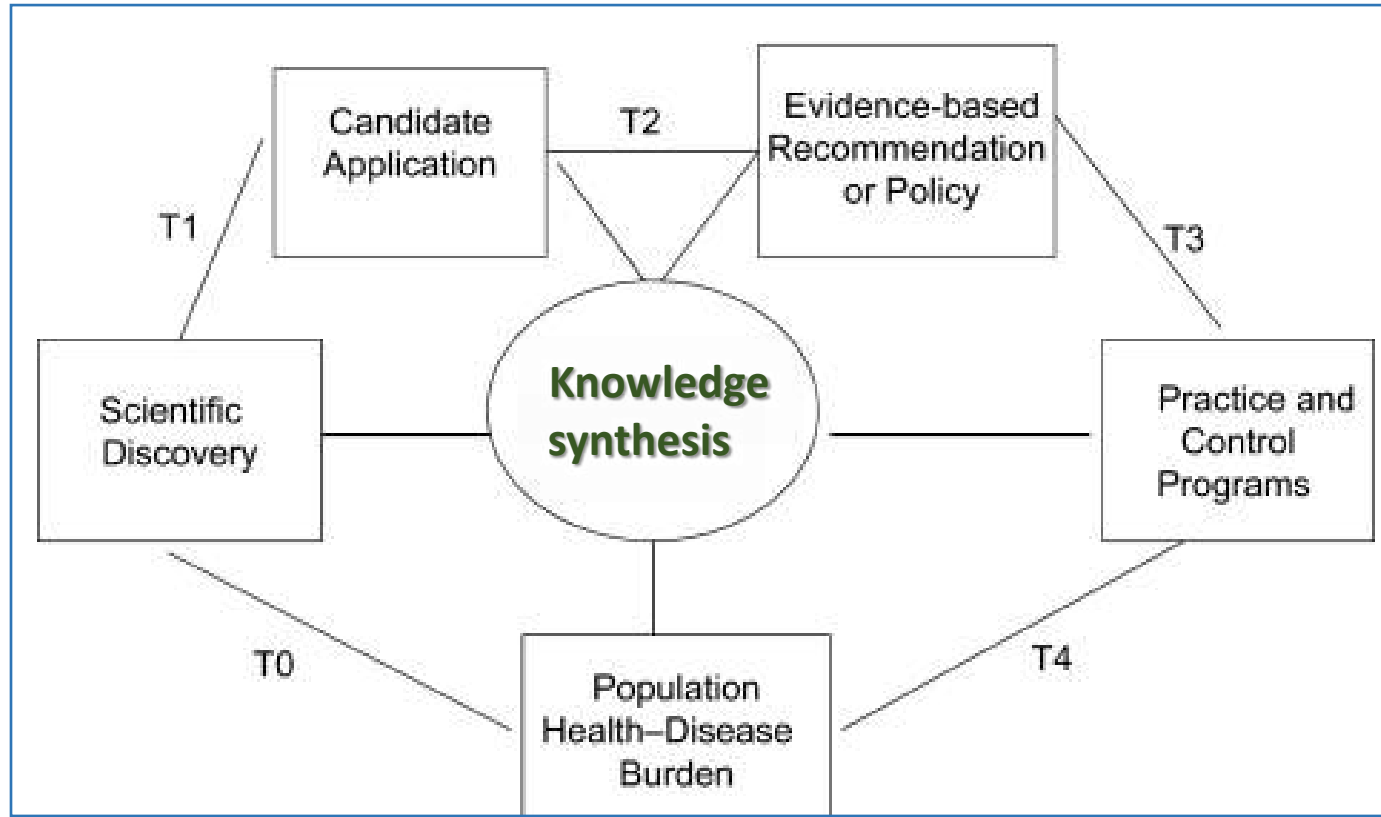
Menuju ketahanan (resiliensi) individu dan komunitas

Toward individual and community resilience

Siklus Penelitian:

Sinergi penelitian dasar dan terapan

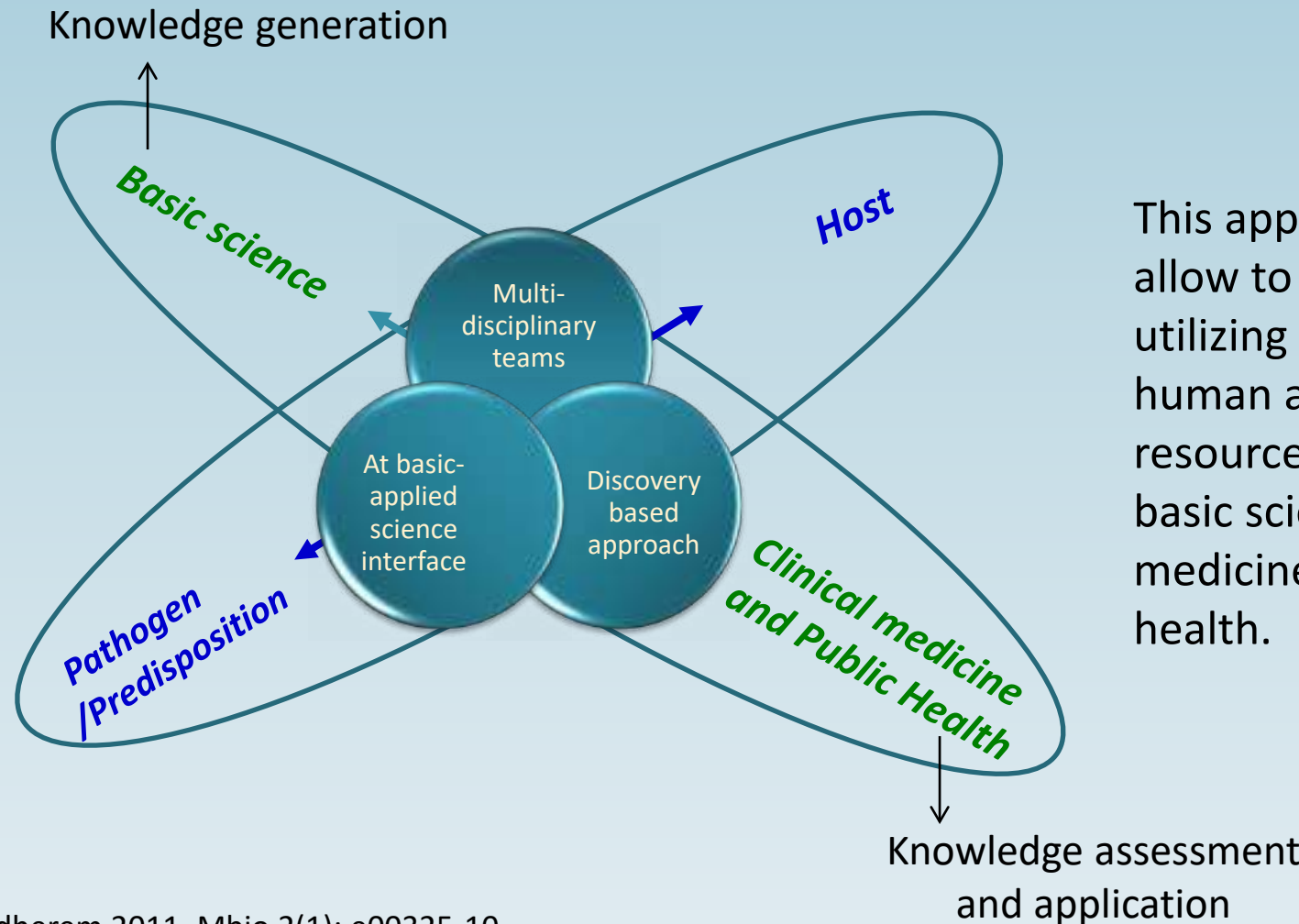
Skema ini menunjukkan rangkaian kesatuan penelitian. Masing-masing fase berperan dalam mendapatkan data, dan membuka jalan untuk kelompok penelitian berikutnya



This research cycle combines basic science, clinical, and public health approaches to disease control, from prevention to treatment, moving specific discoveries from research into practice, which are fundamental to informed decision-making by health-care providers, policy makers, and citizens.

Tiap fase akan memberikan kontribusi dalam kesiapan sintesis ilmu pengetahuan, mulai dari penelitian dasar, klinik, dan komunitas

Inisiatif untuk integrasi riset dasar dan terapan



This approach may allow to maximally utilizing the potential human and science resources that exist in basic science, clinical medicine, and public health.

Menuju ketahanan (resiliensi) individu dan komunitas

Toward individual and community resilience

Definisi

- Ketahanan (resiliens) adalah kemampuan sistem (individu atau kelompok) untuk beradaptasi dan memberi respons terhadap **kesulitan** (*adversity*) (trauma, kejadian luar biasa, tragedi, atau ancaman) yang tak terduga, dan tetap dapat melakukan fungsi secara normal, serta pulih kembali ke keadaan semula.

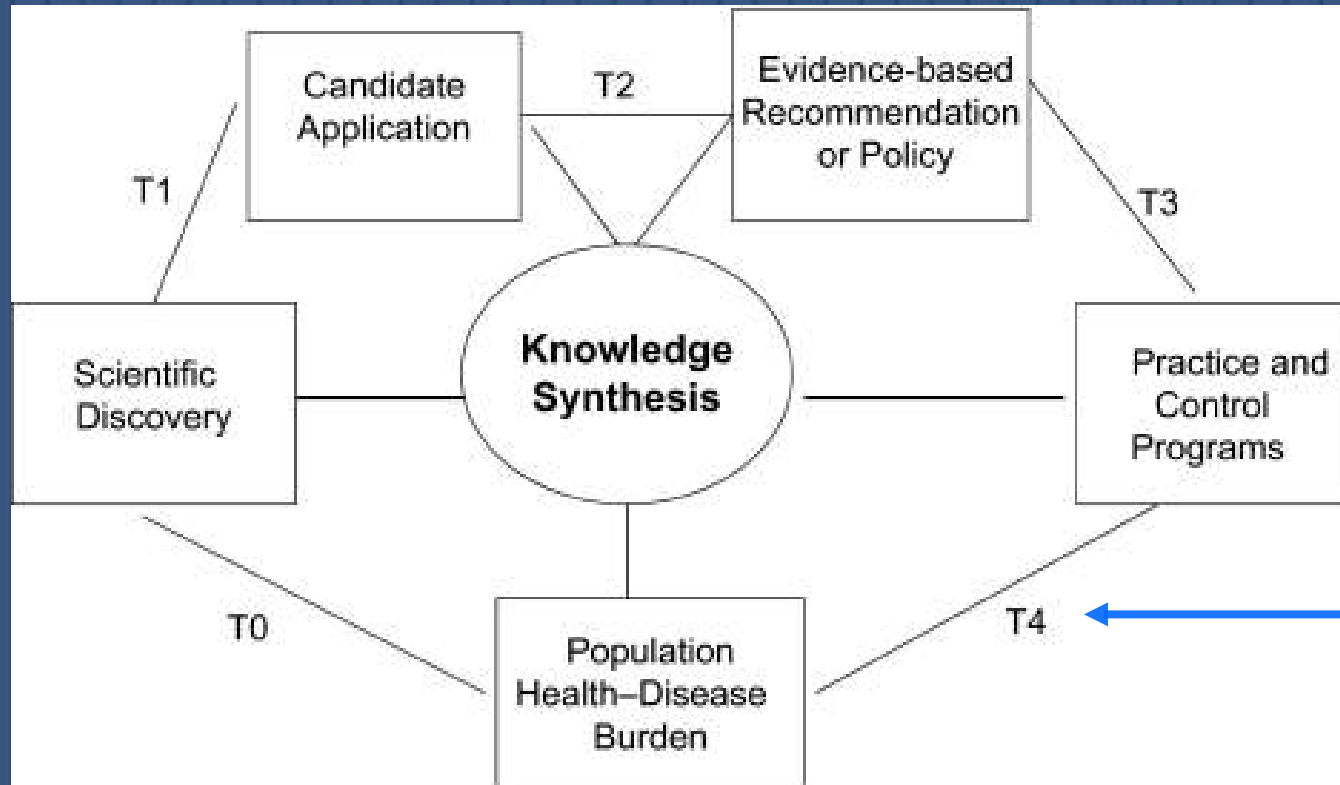
- *Resilience is the ability of systems (as individuals or groups) to adapt and to mount a robust response to unforeseen, unpredicted, and unexpected **adversity** (trauma, tragedy, or threat), and to resume or even continue normal operation, and to recover to back to normal condition*

According to the World Bank Report 2020 and WHO 2017. *Strengthening resilience: a priority shared by Health 2020 and the Sustainable Development Goals*

Dalam bidang Kesehatan

- Resiliens adalah kemampuan individu atau kelompok untuk beradaptasi dan memberi respon secara efektif, sehingga dapat mempertahankan kesehatan, sembuh, dan pulih seperti keadaan semula.
- Hubungan timbal balik 'resiliens' dan 'prevensi'
 - Resiliens = prevensi agar tidak terjadi masalah yang lebih berat.
 - Sebaliknya prevensi berarti 'membangun resiliens'
- Salah satu dasar resiliensi adalah **kesiapan sistem secara optimal** untuk beradaptasi dan bangkit mengatasi masalah-masalah tersebut, baik individu maupun komunitas





This research cycle combines **basic science, clinical, and public health** approaches to disease control, from prevention to treatment, and back from treatment to prevention, which are fundamental to informed decision-making.

Lessons from the pandemic on the value of research infrastructure.
 Roope *et al. Health Res Policy Sys* (2021) 19:54

Oxford Biomedical Research Centre 2021: “lesson from the COVID-19 pandemic on infrastructure is on the option value of research”.

- The pandemic has forced to all elements to struggle, to cope up with the situation, and to rescue lives, and in turn to protect economy
- Extraordinary efforts have been made to expand capacity, better preparation, including development of infrastructure and maximizing use of **existing resources and capacities**
- Successful efforts in building infrastructure have saved lives, and being more efficient economically, for our current and future adversities.

WHO R & D Blueprint (2020) and the United Kingdom National Institute for Health Research Oxford Biomedical Research Centre (2021)

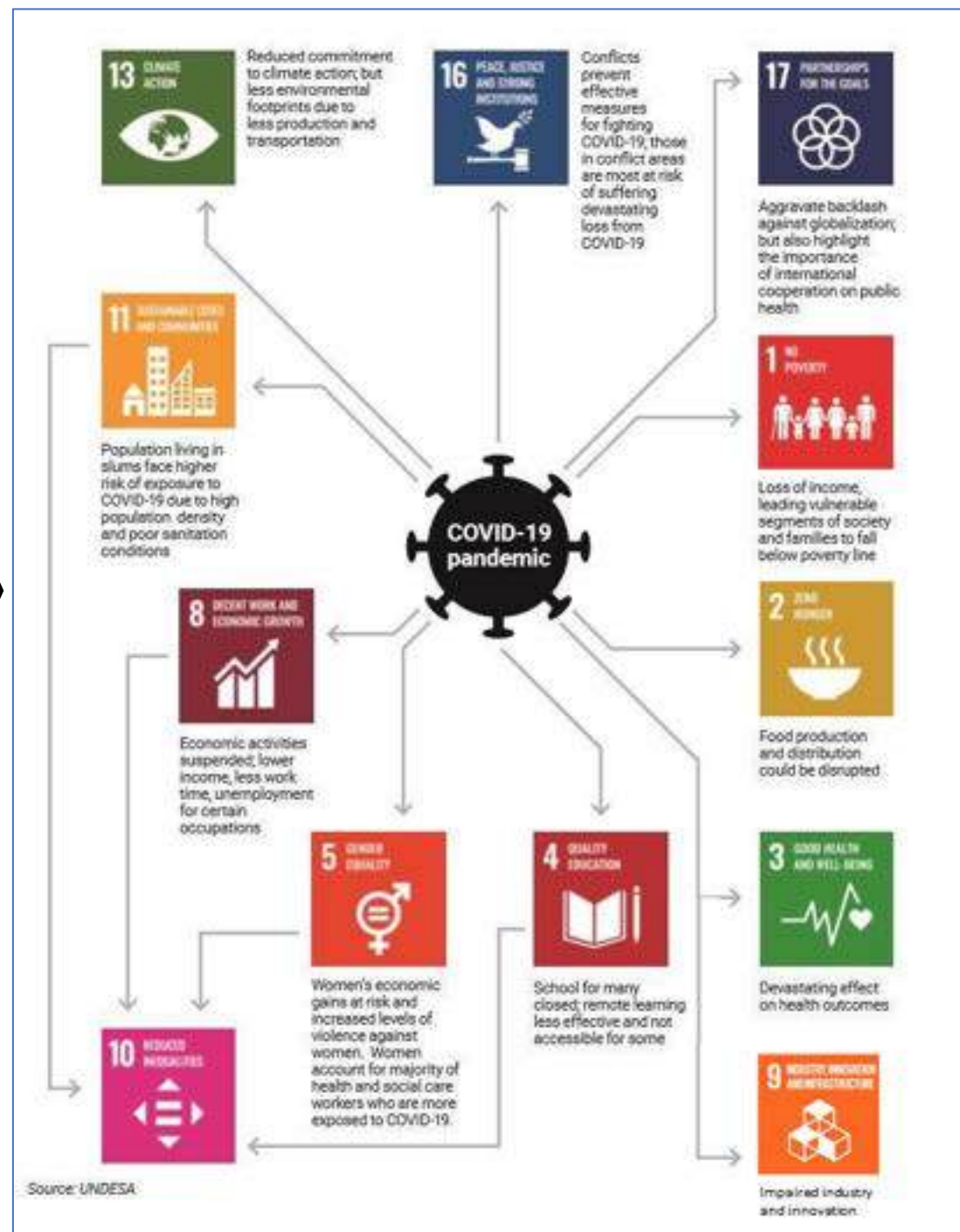
Kesiapan menghadapi pandemi berasosiasi erat dengan kapasitas “*research and development*” yang menggerakkan semua sistem riset, mulai dari riset dasar sampai ke riset terapan, yang akhirnya membuahkan produksi dengan cepat.

Cost-benefit analysis (2021)*

- Systems with better research infrastructure can swift more quickly and scale up research to address the problem, and in the long run, .
- Developing a framework to fully account for option value should allow us to be better prepared for the next emerging problem.

* World Bank 2020; WHO 2020; the United Kingdom National Institute for Health Research Oxford Biomedical Research Centre (UK BRC) 2021.

The pandemic has serious impacts on the ability of many nations to achieve the UN Sustainable Development Goals (SDGs),



Response:
Vigorous research response in countries with established healthcare systems and research infrastructure

Unbalanced resilience:
Critical research questions specific to the needs of resource-limited settings are hard to answer

Research Response to COVID-19

Combining basic, clinical, and public health research



Research gaps summarized by the WHO Strategic and Technical Advisory Group for Infectious Hazards (STAG-IH)
- WHO 2021.

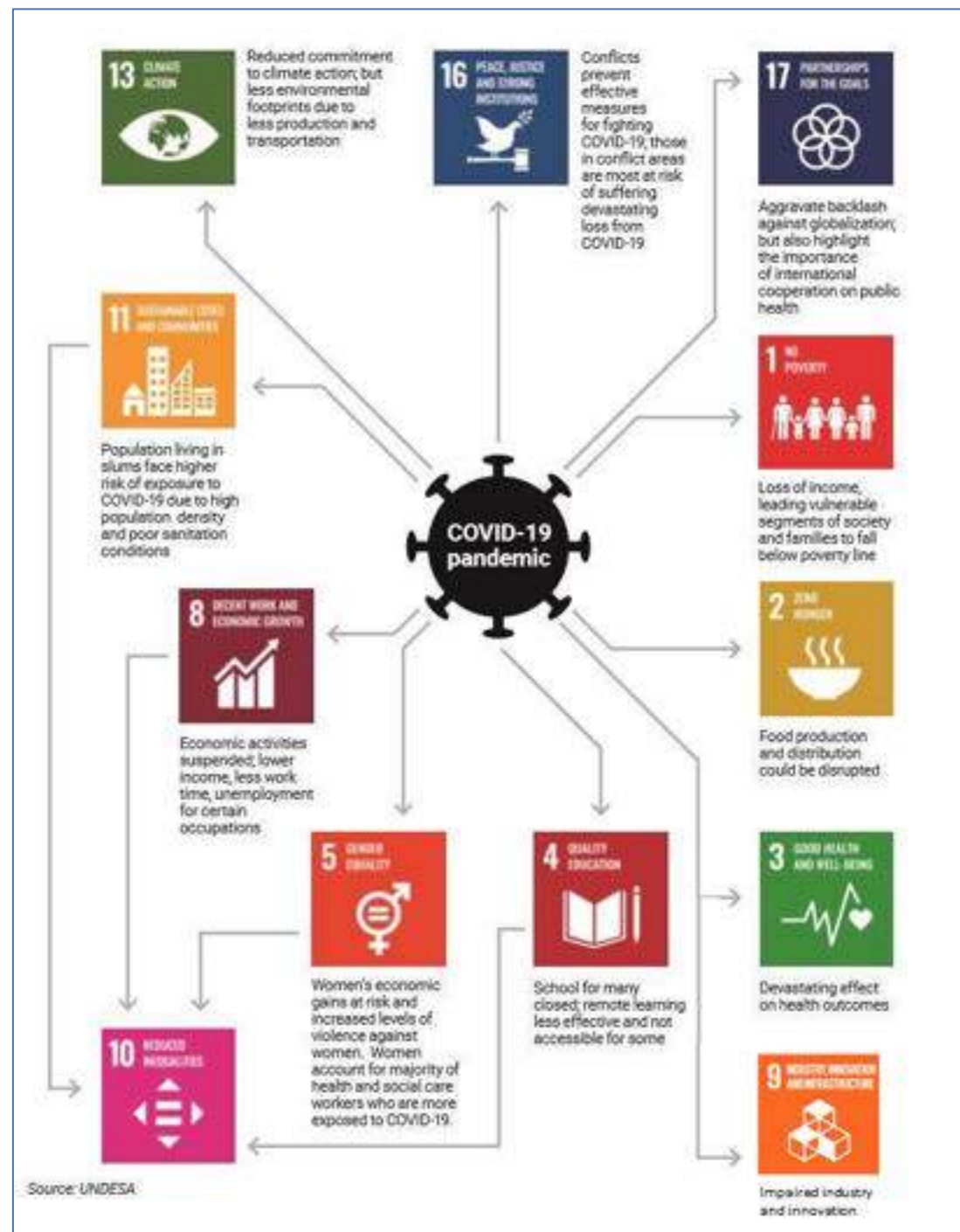
Panel: Research gaps that need to be addressed for the response to COVID-19

- Fill gaps in understanding of the natural history of infection to better define the period of infectiousness and transmissibility; more accurately estimate the reproductive number in various outbreak settings and improve understanding the role of asymptomatic infection.
- Comparative analysis of different quarantine strategies and contexts for their effectiveness and social acceptability
- Enhance and develop an ethical framework for outbreak response that includes better equity for access to interventions for all countries
- Promote the development of [point-of-care diagnostic tests](#)
- Determine the best ways to apply [knowledge about infection prevention and control in health-care settings in resource-constrained countries](#) (including identification of optimal personal protective equipment) and in the broader community, specifically to understand behaviour among different vulnerable groups
- Support standardised, best evidence-based approach for [clinical management](#) and better outcomes and implement randomised, [controlled trials for therapeutics](#) and vaccines as promising agents emerge
- [Validation of existing serological](#) tests, including those that have been developed by commercial entities, and establishment of biobanks and serum panels of well characterised COVID-19 sera to support such efforts
- Complete work on animal models for [vaccine and therapeutic research and development](#)

The pandemic should be regarded as an **opportunity** and **driving force** for changes in the main sectors embraced in the SDGs:

- Mobilization of **researchers and learned societies**
- Capacity building and empowerment

that take to accelerating human sustainable development.



Via two important goals:

- Innovation (SDG9)
- Collaboration (SDG17)



Achieved by
research-informed
policy making

Kesimpulan

Conclusions

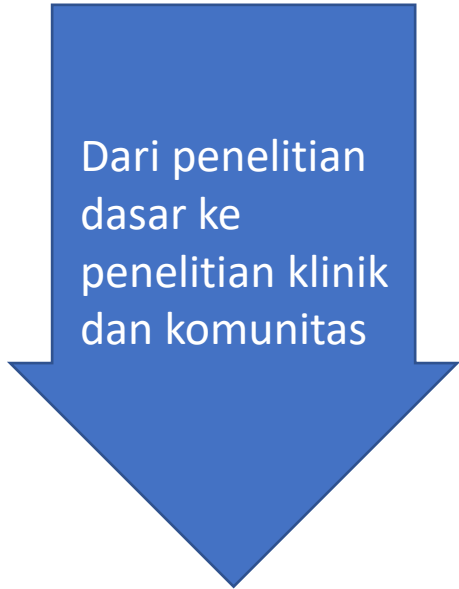
- ❑ Penelitian Dasar dan terapan (klinik dan komunitas) merupakan unsur-unsur utama yang membentuk kapasitas dan ketahanan (resiliences) , baik di tingkat invidual amaupun komunitas.
- ❑ Kapasitas riset yang kuat **disemua aspek** merupakan dasar untuk bertahan dan bangkit kembali

- ❑ *Basic and applied research compose a whole continuum that or inseparable unity that form resilience, both at individual and community levels,*
- ❑ *Strong capacities in all aspects of research provide a strength to be resilient and to rise.*

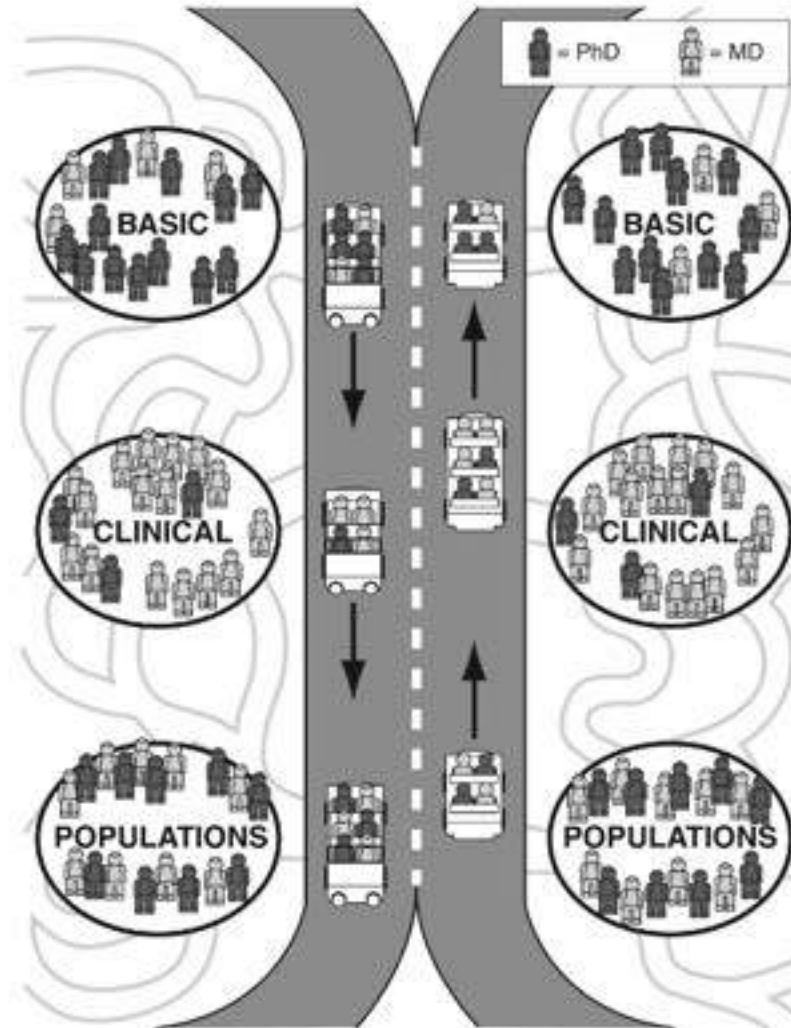
Build resilience through Synergizing Basic and applied Research

From bench and clinics to the public

Dari penelitian dasar ke penelitian klinik dan komunitas

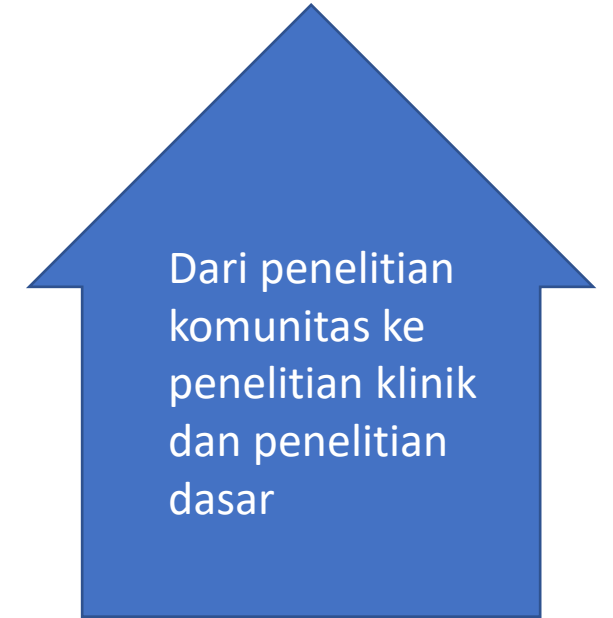


Informasi dari komunitas dan klinik diteliti kembali di penelitian dasar



Informasi dari komunitas dan klinik diteliti kembali di penelitian dasar

Dari penelitian komunitas ke penelitian klinik dan penelitian dasar



From the public back to clinic and bench

Figure 0.2. The schematic two-way highway of medical research, spanning the continuum from basic to clinical to population-based research and beyond. Teams of investigators, including physician-scientists, traverse the highway in both directions, driven in cars containing varying numbers and types of researchers, depending on expertise required at different stages.

*Build Resilience
through
Synergizing Basic and Applied Research*

For Indonesia and the world

Thank you

