Safely Managed Water Services Beyond SDG 6

Ikuro KASUGA, Ph.D

VNU Vietnam Japan University,

Master's Program in Environmental Engineering

JICA Expert/ Assoc. Prof. at The University of Tokyo

VJU Vietnam Japan University VNU since 1906

東京大学 THE UNIVERSITY OF TOKYO

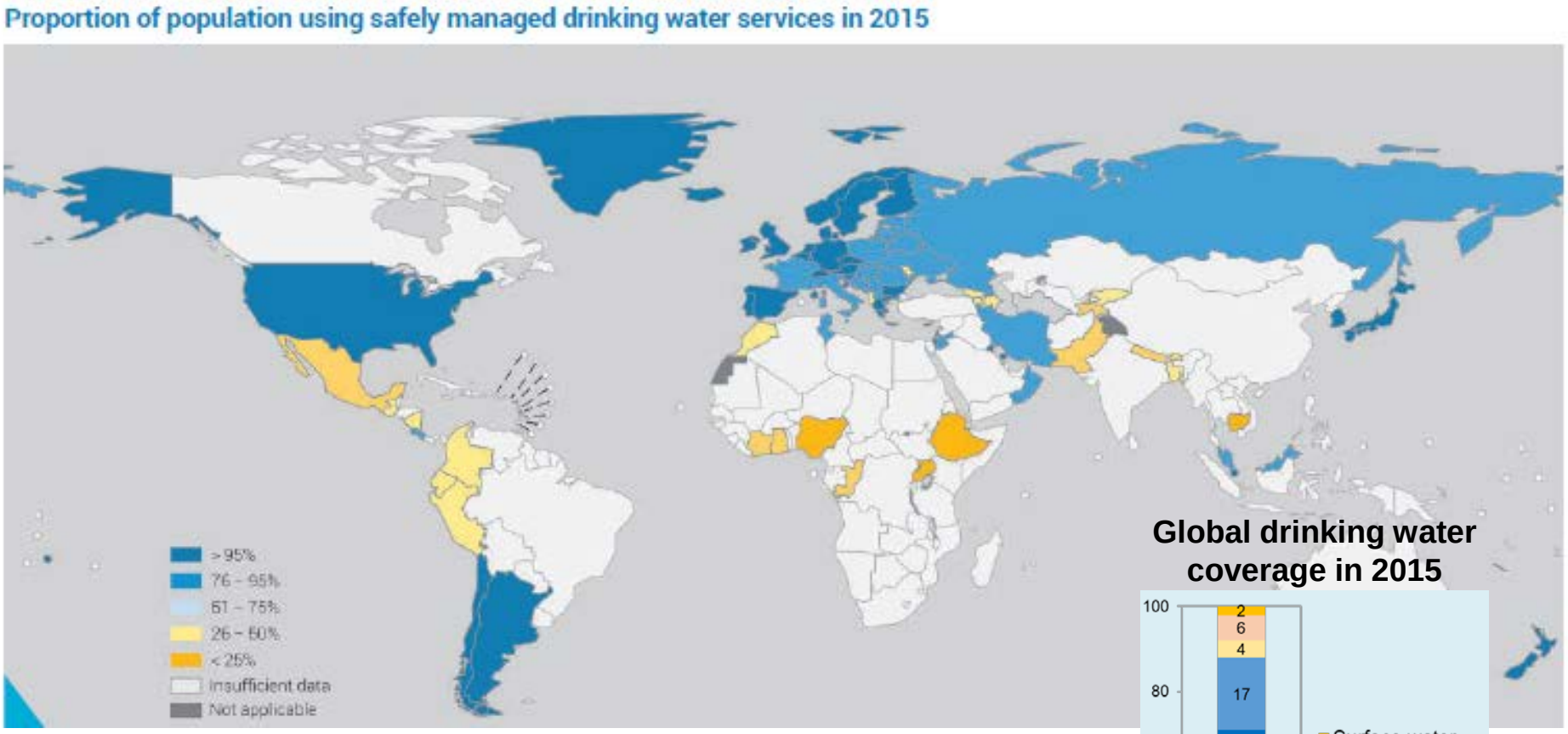
SDG 6: Clean Water and Sanitation

Ensure availability and sustainable management of water and sanitation for all!

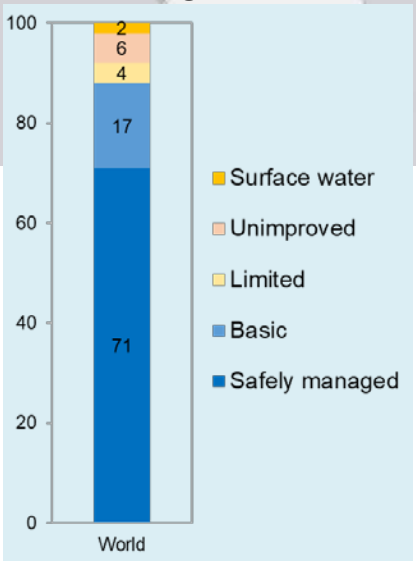
Target 6.1

By 2030, achieve universal access and equitable access to **safe** and affordable drinking water for all

Synthesis Report on Water and Sanitation 2018



Global drinking water coverage in 2015



In 2015, 5.2 billion people used "safely managed drinking water service".

Synthesis Report on Water and Sanitation 2018 (UN)

Definition of “Safely Managed Drinking Water (SMDW)”

MDGs: no service level	SDGs: 3 service parameters
Improved water source	1. Accessibility (Accessible on premises)
Unimproved water source	2. Quantity (Available when needed)
	3. Quality (Free from contamination)

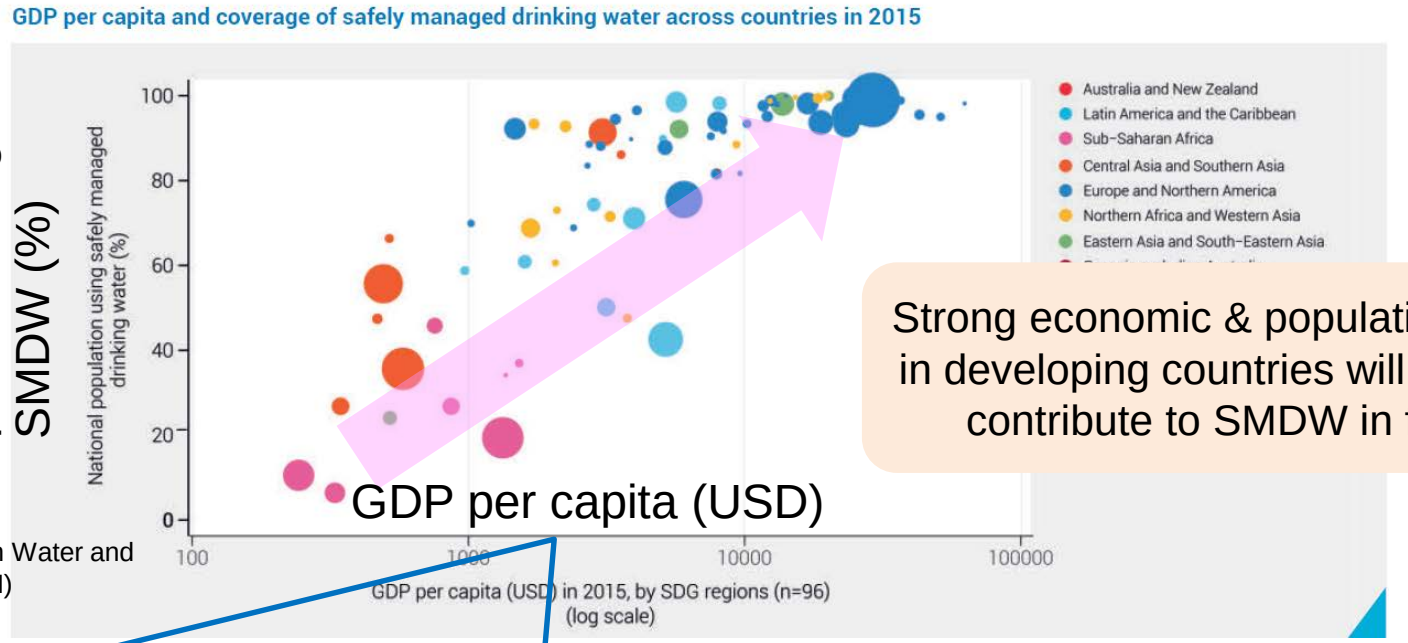
WHO/UNICEF developed new indicators for Joint Monitoring Program for Water Supply, Sanitation and Hygiene (JMP)

Indicators

Service level	Definition
Safely managed	Drinking water from an improved water source which is located on premises, available when needed and free of faecal and priority contamination
Basic	Drinking water from an improved source provided collection time is not more than 30 minutes for a roundtrip including queuing
Limited	Drinking water from an improved source where collection time exceeds over 30 minutes for a roundtrip to collect water, including queuing
Unimproved	Drinking water from an unprotected dug well or unprotected spring
No service	Drinking water collected directly from a river, dam, lake, pond, stream, canal or irrigation channel

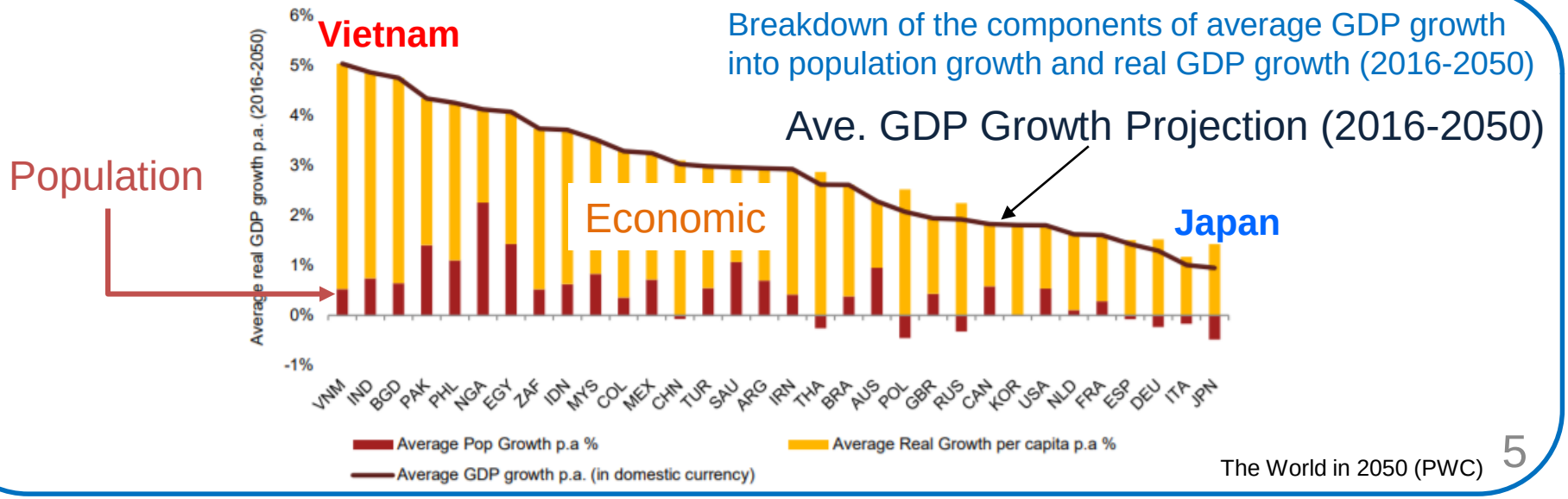
Safely managed drinking water - thematic report on drinking water 2017

Economic/population growth and SMDW



Synthesis Report on Water and Sanitation 2018 (UN)

Strong economic & population growth in developing countries will positively contribute to SMDW in future.



The World in 2050 (PWC)

Is SMDW service sustainable after achieving SDG 6.1?

SDGs: 3 service parameters
1. Accessibility (Accessible on premises)
2. Quantity (Available when needed)
3. Quality (Free from contamination)

SDG 6.1 is just a stepping stone.

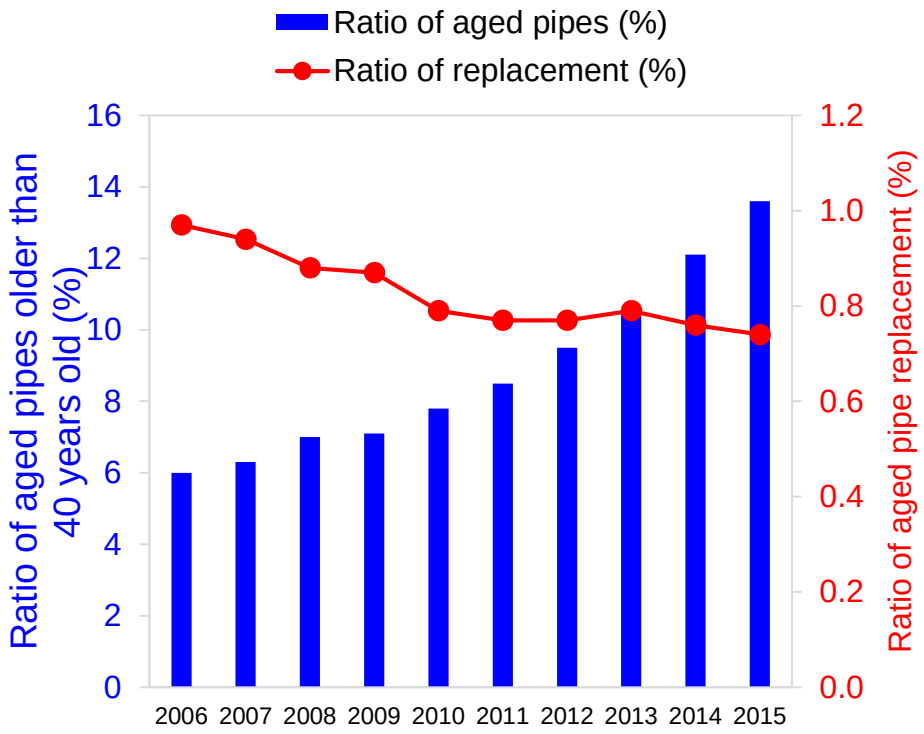
Continuous investment and further capacity building is required for sustainable operation of SMDW service.

- SMDW service is still vulnerable to
  - **Social risks**
  - **Emerging chemical/microbial threats**

Social risks: Aging water infrastructure

Developed countries already face issues on aging water infrastructure.

- Water infrastructure needs continuous maintenance.
- Tremendous cost is required for replacement/rehabilitation.



Replacement of aged pipes slows down in Japan

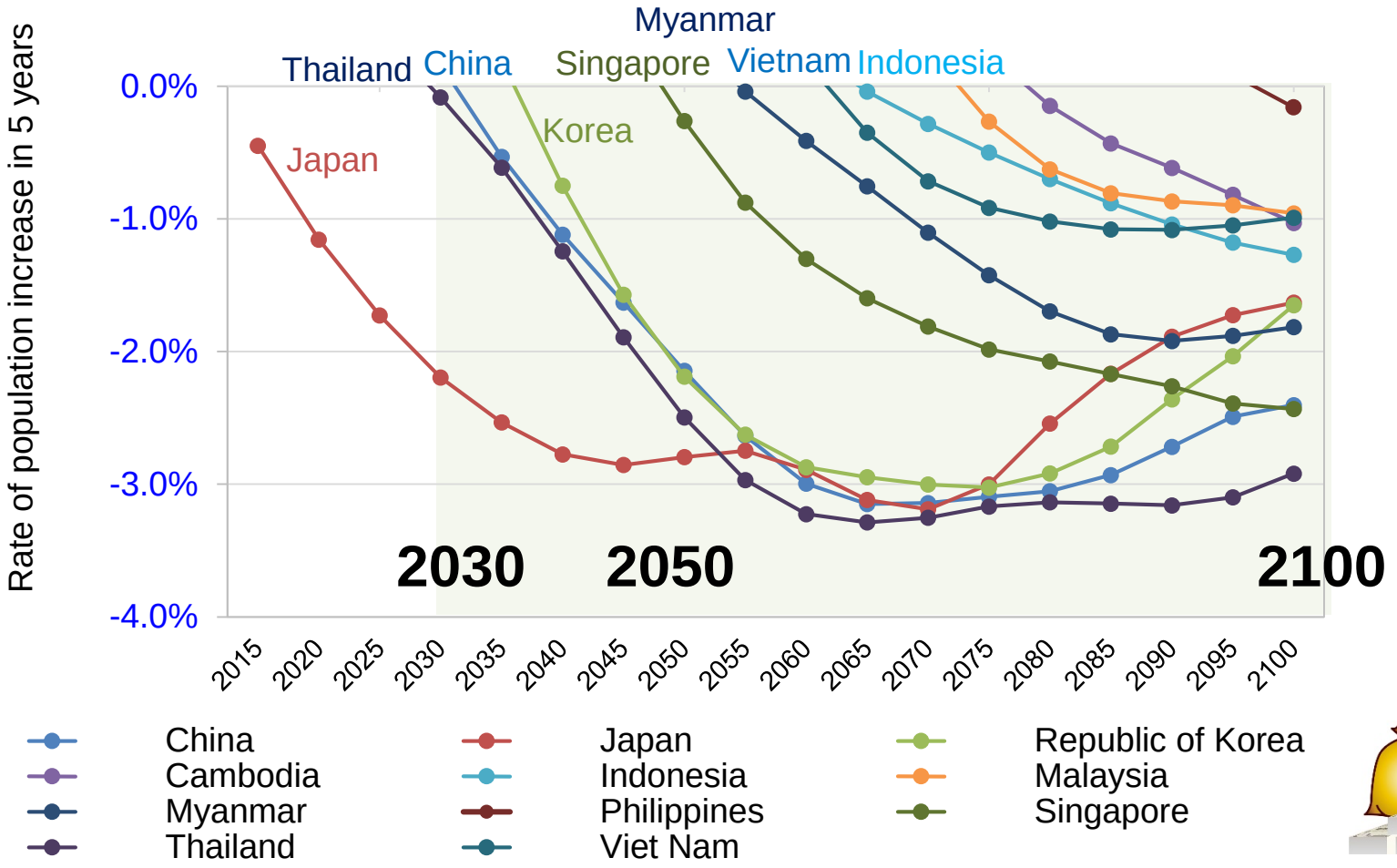
MHLW, Japan

Social risks: Flint water crisis in MI (2014-2015)

- Financial collapse of Flint City led to cost-cutting water supply system, resulting in deterioration of drinking water quality.
  - Financial sustainability is key for SMDW.

Social risks: Depopulation in Asia

Many countries in East and South-eastern Asia will face depopulation after 2030, which could adversely affect national economy.



Self- and sustainable-finance for water infrastructure should be prepared in advance for depopulation.

World Population Prospects 2017

Emerging chemical/microbial threats to SMDW

- Emerging threats
  - Climate change and water scarcity….
  - **Chemical/microbial threats**
    - SDG 6.1: Free of faecal and priority contamination (Minimum safety)

Constraints

- **Poor readiness for appropriate/immediate reaction to unexpected accidents.**
- **Absence of faecal contamination does not always guarantee safety.**
- **Regulation can NOT regulate all unknown risks.**

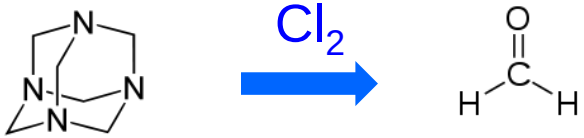
Chemical risks: 145 million chemical substances[1)]

CAS Registry

Unknown substances whose risks are not well clarified
can cause significant impacts on water use.

Chiba Prefecture, Japan (2012)[1)]

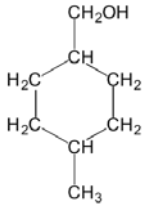
870,000 residents



Hexamethylenetetramine (HMT) Formaldehyde

West Virginia, USA (2014)[2)]

300,000 residents



4-Methylcyclohexanemethanol (MCHM)

- STOP of water supply = STOP of urban function.
- Conventional treatment is vulnerable to (hydrophilic) chemicals.
- Preparation for emergency response to unknown chemicals are poor.

1) https://www.wateronline.com/ 2) https://www.chibanippo.co.jp/news/politics/82533

Microbial risks: Waterborne outbreak of *Cryptosporidiosis*

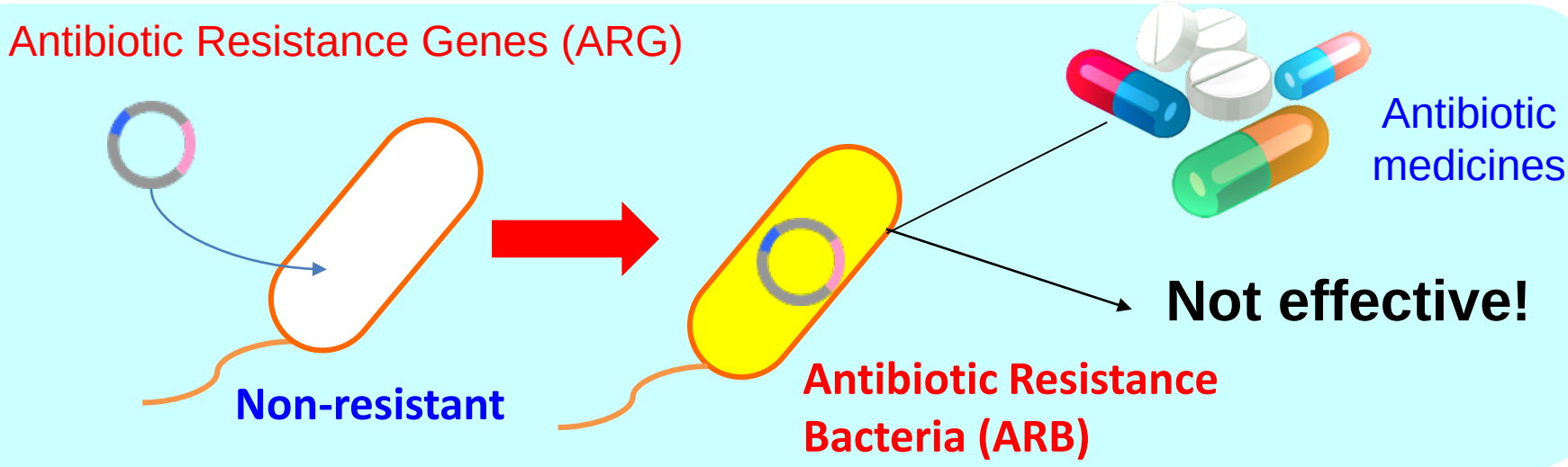
- Chlorine-resistant zoonotic parasite *Cryptosporidium*
  - Milwaukee, USA, 1993: **400,000** patients (25% of total pop.)
  - Ogose, Japan, 1996: **9,000** patients (70%)
  - Ostersund, Sweden, 2010: **27,000** patients (45%)

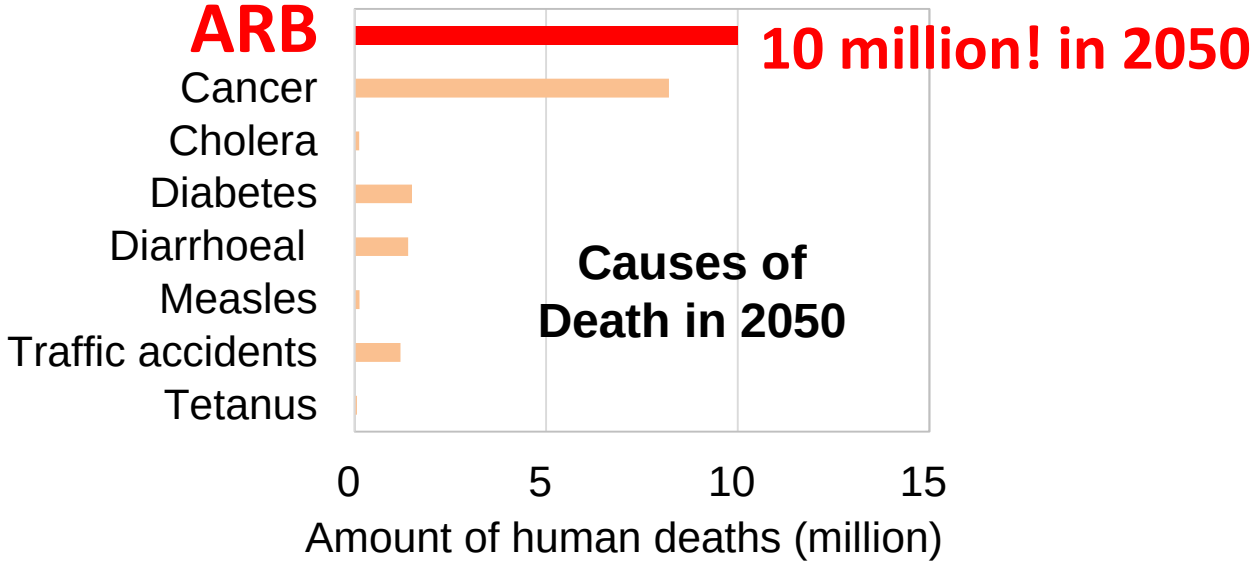
Tremendous healthcare costs and productivity losses

- Chlorine is not effective to *Cryptosporidium*.
- Safety in SDG 6 just guarantees the absence of faecal contamination (*E. coli*).

Multiple safety barriers should be incorporated into SMDW service from source to the end of pipes.

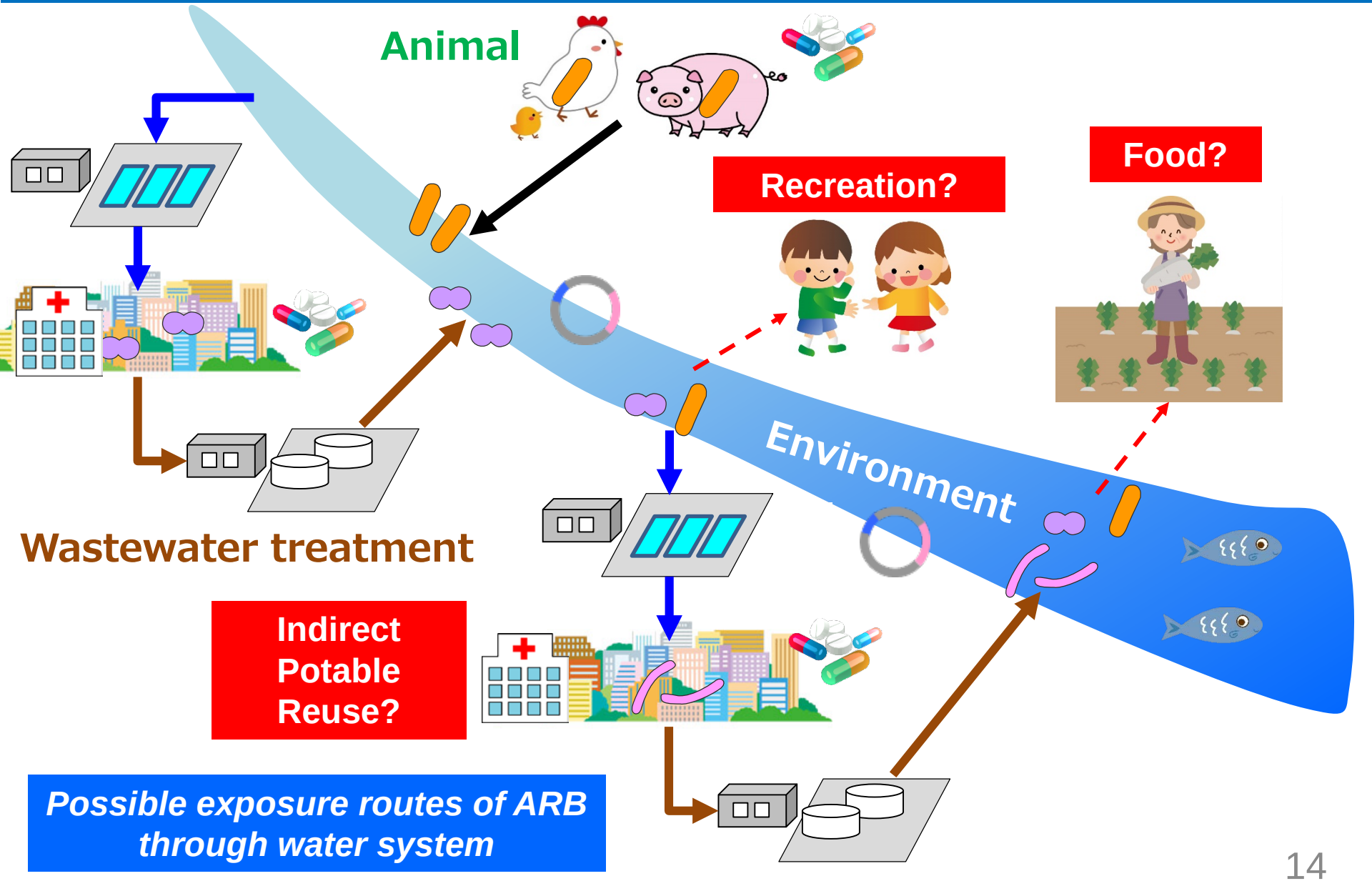
Great microbial threats: Antibiotic Resistance





Antimicrobial Resistance: Tackling a crisis for the health and wealth of nations, 2014

Possible impacts of ARB in water system

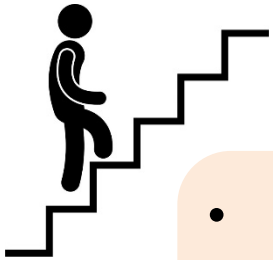


Possible exposure routes of ARB through water system

Take-home message

Safely Managed Drinking Water Service in SDG 6 is still vulnerable to social risks and emerging threats.

- **Social risks**
- **Emerging threats**



SMDW beyond SDG 6

- SMDW service in target 6.1 is just a stepping stone.
- Sustainable operation of SMDW service needs continuous efforts.
- Preparation for emergency responses to unknown risks and social crisis related to water service is required.

Thank you for kind attention