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2453-7

School on Modelling Tools and Capacity Building in Climate and Public Health

15 - 26 April 2013

Public Health Surveillance and Climate

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The International Research Institute for Climate and Society

Public Health Surveillance and Climate

Spring School on Modelling tools and capacity building in climate and public health

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Objectives

- Briefly review public health surveillance
- Reminder about uses of surveillance data
- Relationship between climate and public health surveillance
- Encourage broader thinking about a link between surveillance and climate

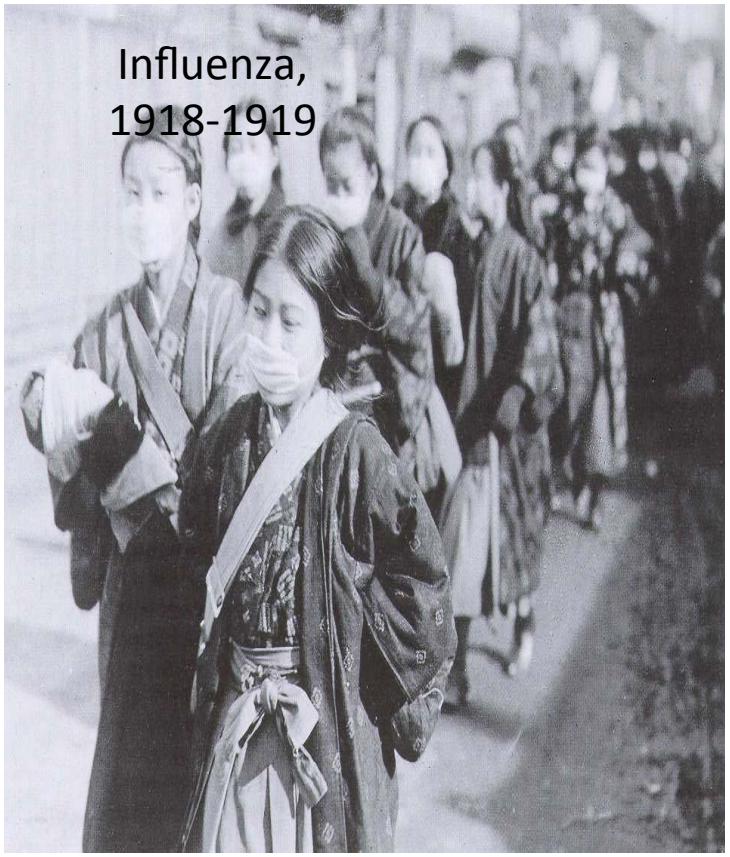
Public Health Surveillance Definition

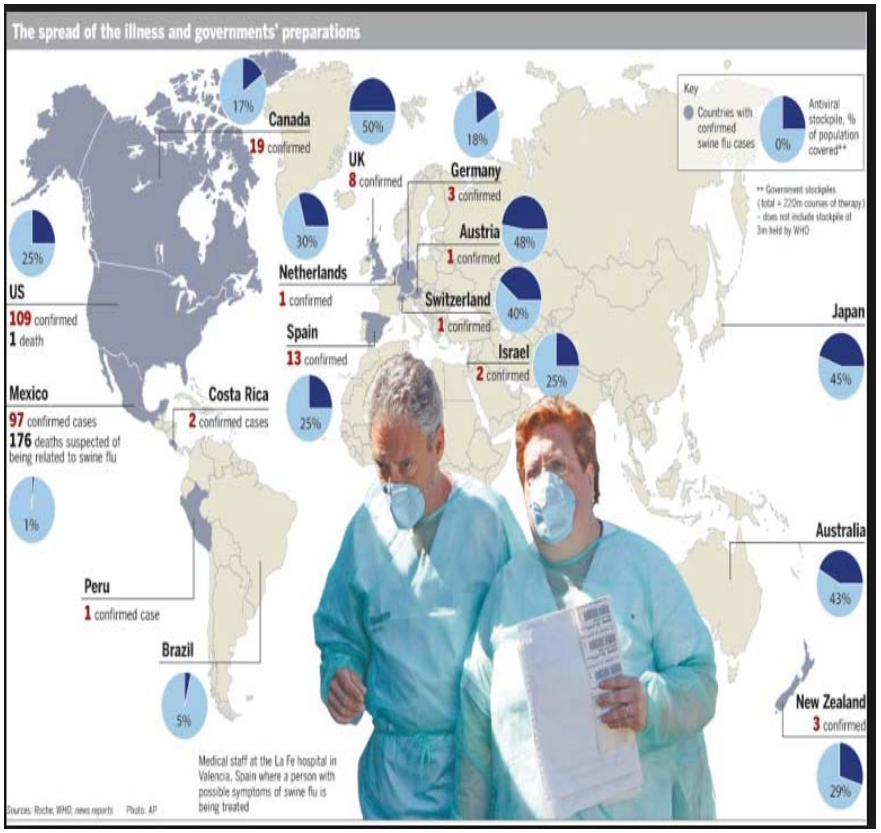
Public Health Surveillance is the ongoing systematic collection, analysis, interpretation, and dissemination of health data.

- *This is a mechanism that public health agencies use to monitor the health of their communities. Its purpose is to provide a factual basis from which agencies can appropriately set priorities, plan programs, and take action to promote and protect the public's health*

Principles of Epidemiology, Second Edition, CDC, 1992.

Emerging Infectious Diseases: Time for Global Surveillance





Influenza 1918-1919

Purposes of Public Health Surveillance

- Assess public health status
- Trigger public health action
- Define public health priorities
- Comply with International Regulations (IHR)
- Evaluate programs

Public Health Surveillance

- Systematic
- Ongoing
- Collection
- Analysis
- Interpretation
- Dissemination information
- Link to public health practice - policy

Surveillance is

Information for Action

"The reason for collecting, analyzing and disseminating information on a disease is to control that disease.

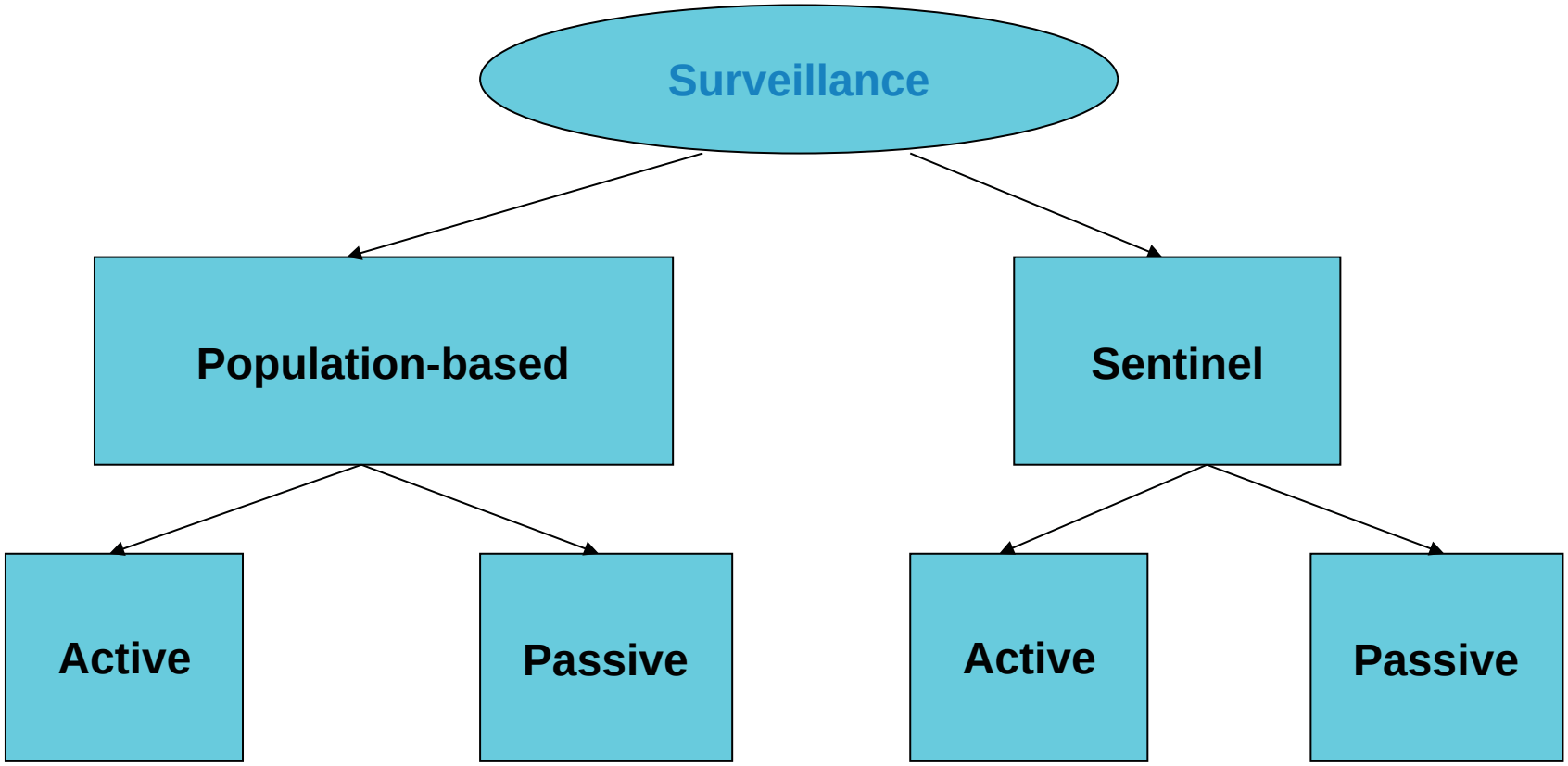
Collection and analysis should not be allowed to consume resources if action does not follow."

- William Foege et al., Int. J of Epidemiology 1976; 5:29-37

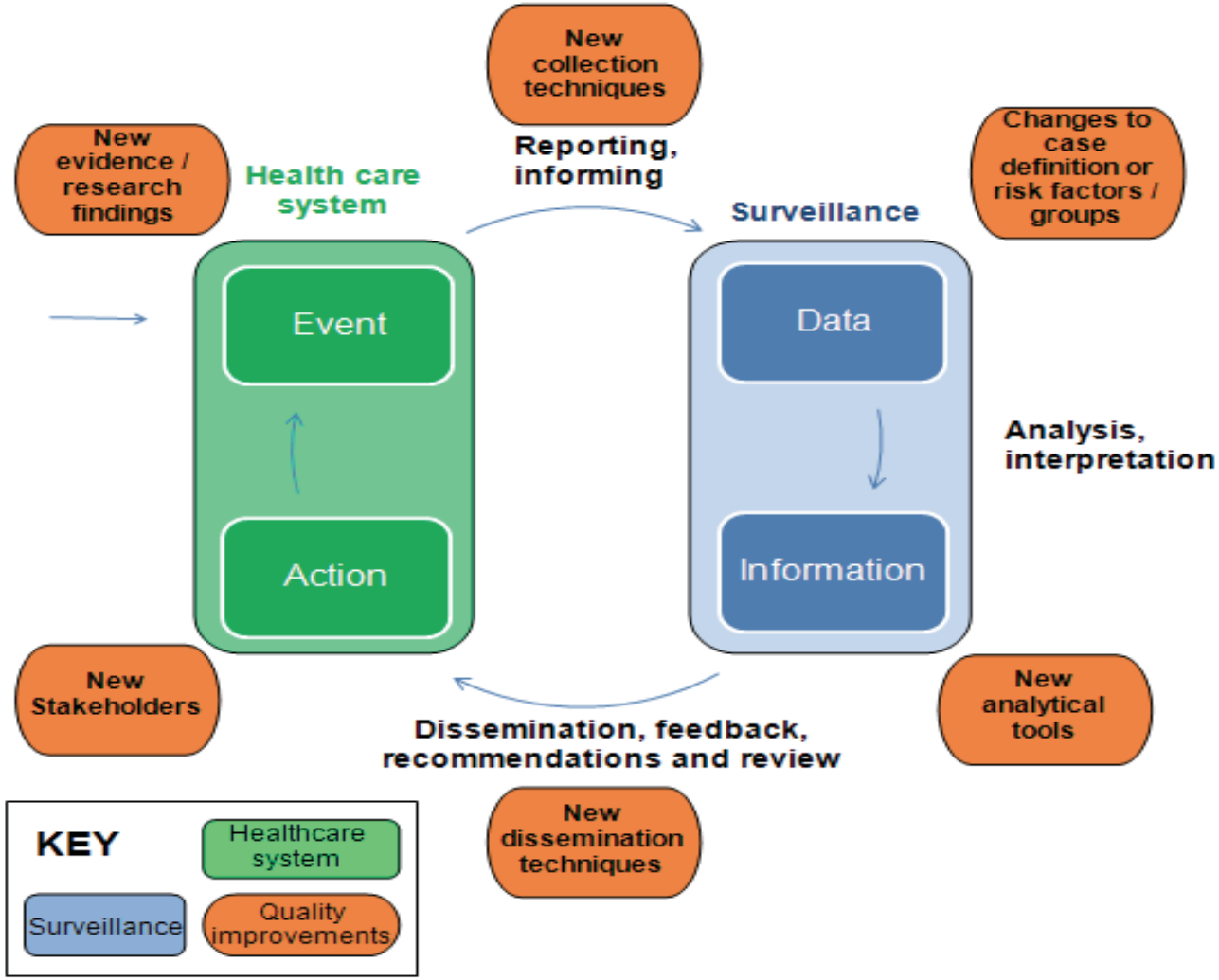
Process of Public Health Surveillance

1. Data collection
2. Data analysis
3. Data interpretation
4. Data dissemination
5. Link to action ..info

Types of Surveillance



Model for developing surveillance system



Regulatory Foundation
Case Definitions
Case Report Forms
Reporting Pathway

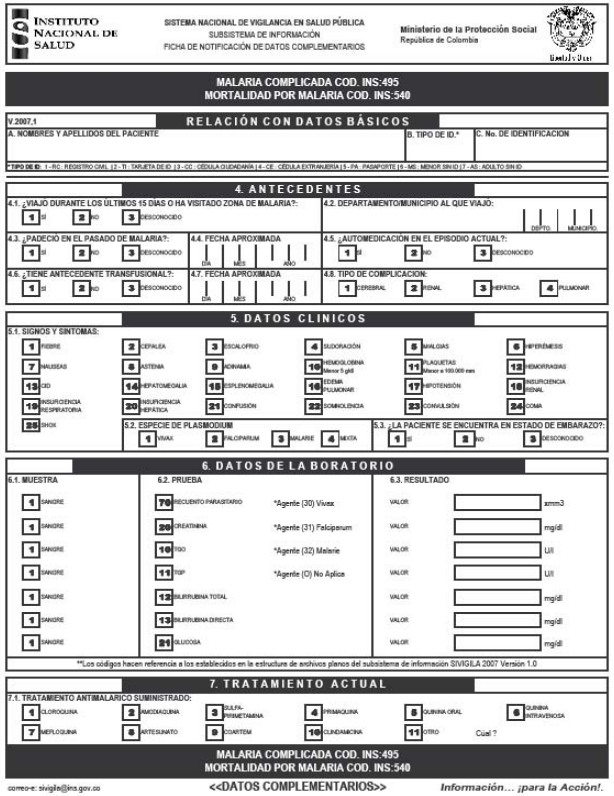
Resources &
Training

Data Sources

- Notifiable diseases
- Laboratories
- Vital records
- Registries
- Surveys
- Administrative data systems
- Other data sources

Types of Data on Surveillance Case Report Forms

- Identifying information
- Demographic information
- Clinical information
- Exposure / risk factor information
- Reporter information
- Climate data?
  - Temp, precipitation?



INSTITUTO NACIONAL DE SALUD

SISTEMA NACIONAL DE VIGILANCIA EN SALUD PÚBLICA
SUBSISTEMA DE INFORMACIÓN
FICHA DE NOTIFICACIÓN DE DATOS COMPLEMENTARIOS

Ministerio de la Protección Social
República de Colombia

MALARIA COMPLICADA COD. INS:495
MORTALIDAD POR MALARIA COD. INS:540

V.2007.1

RELACIÓN CON DATOS BÁSICOS

A. NOMBRES Y APELLIDOS DEL PACIENTE | B. TIPO DE ID.* | C. No. DE IDENTIFICACION

*TIPO DE ID: 1 - RC - REGISTRO CIVIL | 2 - TI - TARJETA DE ID | 3 - CC - CÉDULA CIUDADANÍA | 4 - CE - CÉDULA EXTRANJERÍA | 5 - PA - PASAPORTE | 6 - MS - MENOR SIN ID | 7 - AS - ADULTO SIN ID

4. ANTECEDENTES

4.1. ¿VIAJÓ DURANTE LOS ÚLTIMOS 15 DIAS O HA VISITADO ZONA DE MALARIA?: 1 SI 2 NO 3 DESCONOCIDO
4.2. DEPARTAMENTO/MUNICIPIO AL QUE VIAJÓ: DEPTO. MUNICIPIO
4.3. ¿PADECIÓ EN EL PASADO DE MALARIA?: 1 SI 2 NO 3 DESCONOCIDO
4.4. FECHA APROXIMADA: DIA MES AÑO
4.5. ¿AUTOMEDICACIÓN EN EL EPISODIO ACTUAL?: 1 SI 2 NO 3 DESCONOCIDO
4.6. ¿TIENE ANTECEDENTE TRANSFUSIONAL?: 1 SI 2 NO 3 DESCONOCIDO
4.7. FECHA APROXIMADA: DIA MES AÑO
4.8. TIPO DE COMPLICACION: 1 CEREBRAL 2 RENAL 3 HEPÁTICA 4 PULMONAR

5. DATOS CLINICOS

5.1. SIGNOS Y SINTOMAS:
1 FIEBRE, 2 CEFALEA, 3 ESCALOFRIO, 4 SUDORACIÓN, 5 MIALGIAS, 6 HIPEREMESIS, 7 NAUSEAS, 8 ASTENIA, 9 ADINAMIA, 10 HEMOGLOBINA Menor 5 gr/dl, 11 PLAQUETAS Menor a 100.000 mm, 12 HEMORRAGIAS, 13 ICD, 14 HEPATOMEGALIA, 15 ESPLENOMEGALIA, 16 EDEMA PULMONAR, 17 HIPOTENSIÓN, 18 INSUFICIENCIA RENAL, 19 INSUFICIENCIA RESPIRATORIA, 20 INSUFICIENCIA HEPÁTICA, 21 CONFUSIÓN, 22 SOMNOLENCIA, 23 CONVULSIÓN, 24 COMA, 25 SHOX
5.2. ESPECIE DE PLASMODIUM: 1 VIVAX, 2 FALCIPARUM, 3 MALARIE, 4 MIXTA
5.3. ¿LA PACIENTE SE ENCUENTRA EN ESTADO DE EMBARAZO?: 1 SI 2 NO 3 DESCONOCIDO

6. DATOS DE LA BORATORIO

6.1. MUESTRA	6.2. PRUEBA		6.3. RESULTADO	
1 SANGRE	70 RECUENTO PARASITARIO	*Agente (30) Vivax	VALOR	mm3
1 SANGRE	20 CREATININA	*Agente (31) Falciparum	VALOR	mg/dl
1 SANGRE	10 TGO	*Agente (32) Malarie	VALOR	U/l
1 SANGRE	11 TGP	*Agente (0) No Aplica	VALOR	U/l
1 SANGRE	12 BILIRRUBINA TOTAL		VALOR	mg/dl
1 SANGRE	13 BILIRRUBINA DIRECTA		VALOR	mg/dl
1 SANGRE	21 GLUCOSA		VALOR	mg/dl

**Los códigos hacen referencia a los establecidos en la estructura de archivos planos del subsistema de información SIVIGILA 2007 Versión 1.0

7. TRATAMIENTO ACTUAL

7.1. TRATAMIENTO ANTIMALARICO SUMINISTRADO:
1 CLOROQUINA, 2 AMODIAQUINA, 3 SULFA-PIRIMETAMINA, 4 PRIMAQUINA, 5 QUININA ORAL, 6 QUININA INTRAVENOSA, 7 MEFLOQUINA, 8 ARTESUNATO, 9 COARTEM, 10 CLINDAMICINA, 11 OTRO Cúal ?

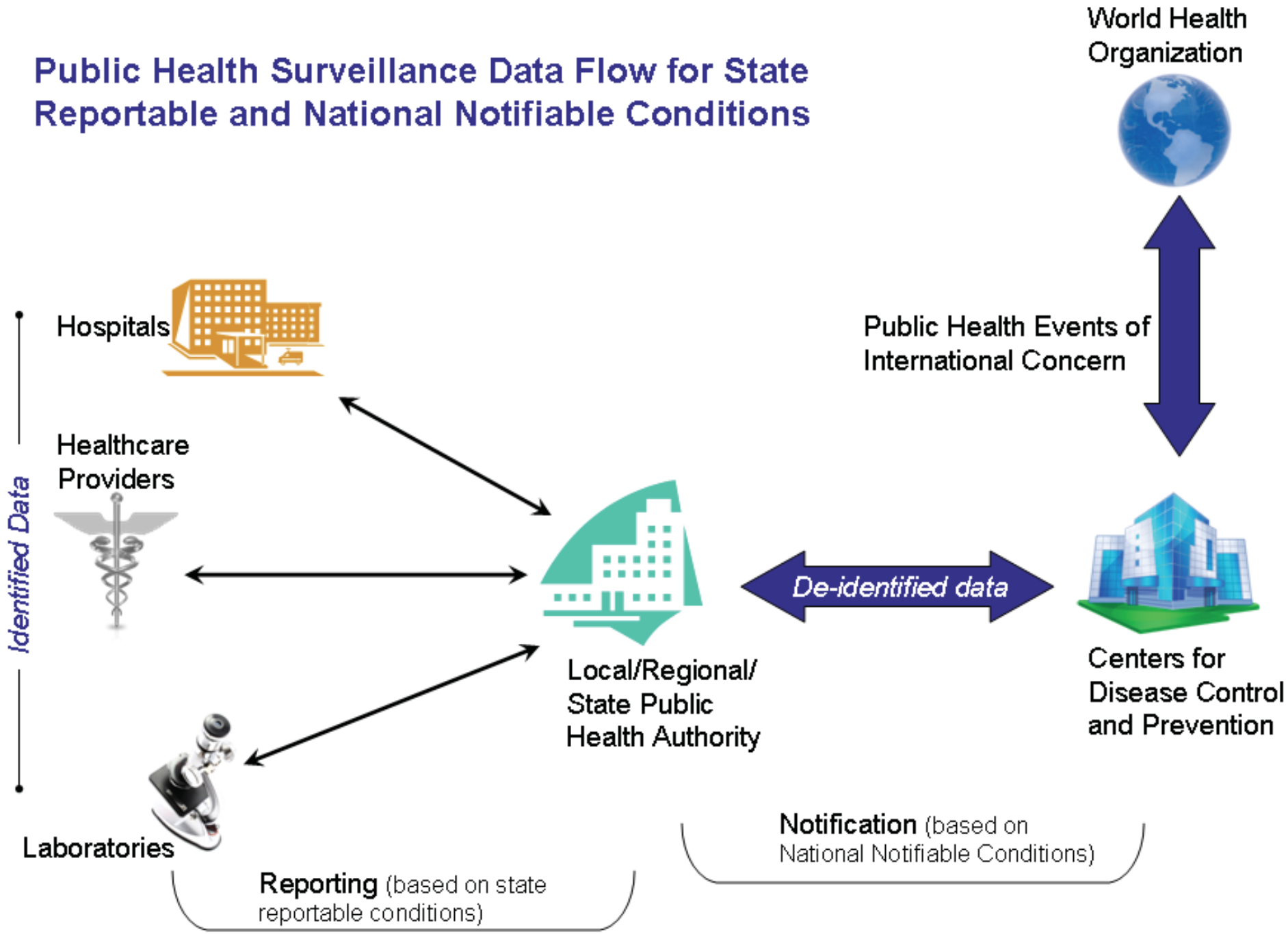
MALARIA COMPLICADA COD. INS:495
MORTALIDAD POR MALARIA COD. INS:540

correo-e: sivigila@ins.gov.co

<<DATOS COMPLEMENTARIOS>>

Información... ¡para la Acción!.

Public Health Surveillance Data Flow for State Reportable and National Notifiable Conditions



Notifiable Infectious Diseases

Vector-borne

Malaria
Dengue fever
Lyme disease
Rocky Mountain spotted fever
Encephalitis: St. Louis, Murray Valley, Western Equine
Rift Valley fever
Ross River fever
Ehrlichiosis
Hantavirus pulmonary syndrome
Leishmaniasis
African trypanosomiasis
Tularemia
Plague
Onchoceriasis (river blindness)

Water and Foodborne

Cholera
Other non-cholera *Vibrio spp.* (*i.e., V. vulnificus, V. parahaemolyticus*)
Leptospirosis
Schistosomiasis
Sea bather's eruption
Giardiasis
Cryptosporidiosis
Human enteric viruses (Enteroviruses,.Norwalk and Norwalk-like viruses)
Campylobacteriosis
Cyclospora cayetanensis
Salmonella enteritidis

Airborne (and others)

Meningococcal meningitis
Coccidioidomycosis
Respiratory syncytial virus (colds)
Legionnaires' disease

Influenza

Combining Surveillance and Climate Data

Historical interest in Early Warning Systems

- 1990s new developments
- Data availability
- Epidemiological modeling
- Information technology
- Scientific evidence of climate change
- Public acceptance of human impact on climate
- Disasters such as Hurricane Katrina in US

Combining Surveillance with Climate Data

"Linkages between climate and infectious diseases are often poorly understood, and research to understand the causal relationships is in its infancy" *EID, June 2001*

Combining Surveillance with Climate Data

Climatic impact on infectious diseases

- Human behavior: indoors in winter and influenza
- Disease pathogens: temp increases affect reproduction
- Disease vectors: distribution and development

Other factors

- Population vulnerability
- Population movements
- Agricultural practices

Combining Surveillance with Climate Data

New concept reflecting “wholistic” approach to broader ecology of disease determinants

– Earth science and health not seen as connected

Surveillance as “counting” mechanism

– Expectation about disease frequency

What can climate add

– **Prediction, early intervention and control**

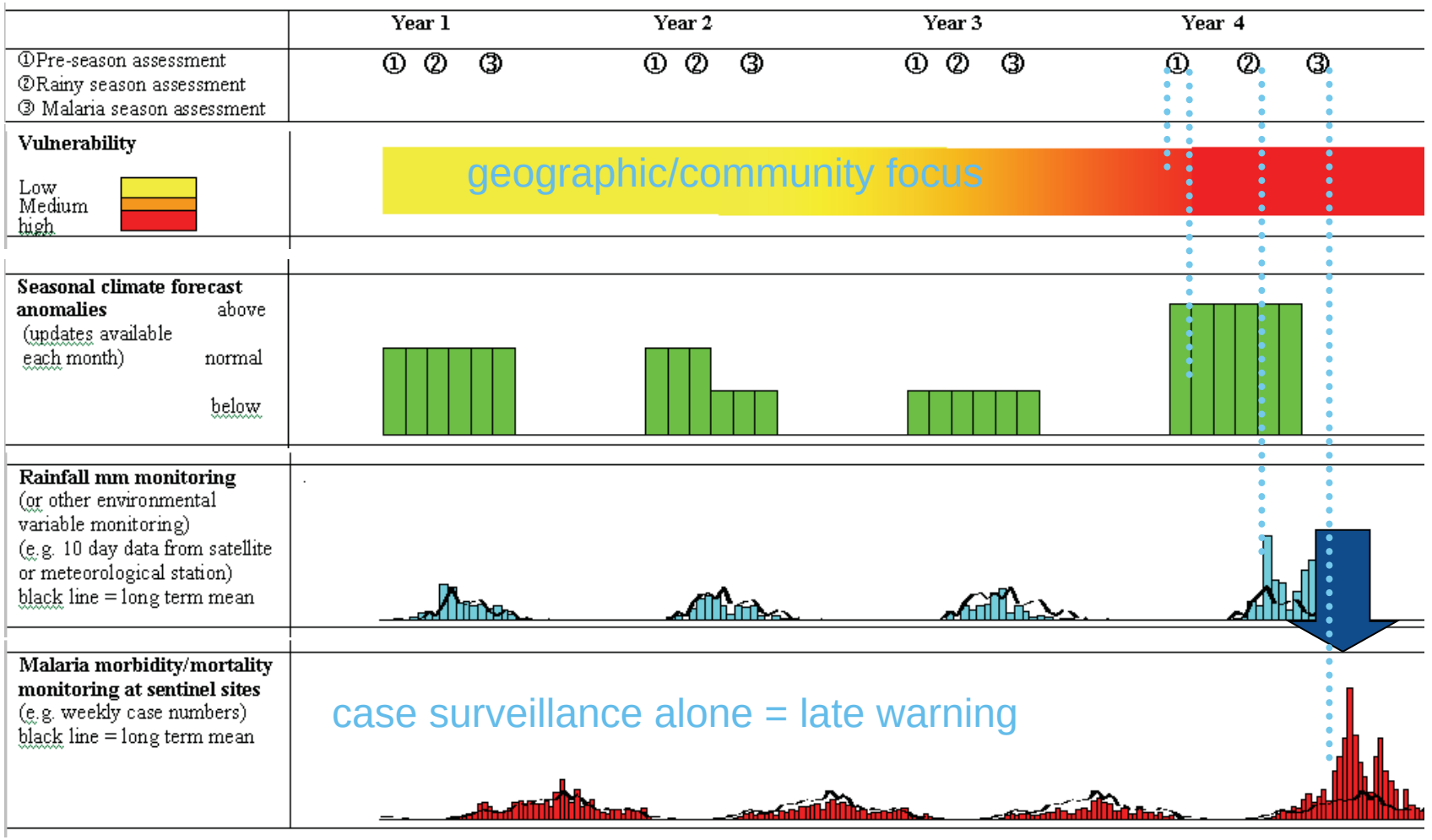
Combining Surveillance with Climate Data

- Vector-borne disease often the focus for climate related health
- Evidence base needs strengthening
- Disease where climate and surveillance research have been focused
  - Malaria
  - Dengue
  - West Nile Virus
  - St. Louis Encephalitis
  - Tick-borne diseases

Climate and Infectious Diseases

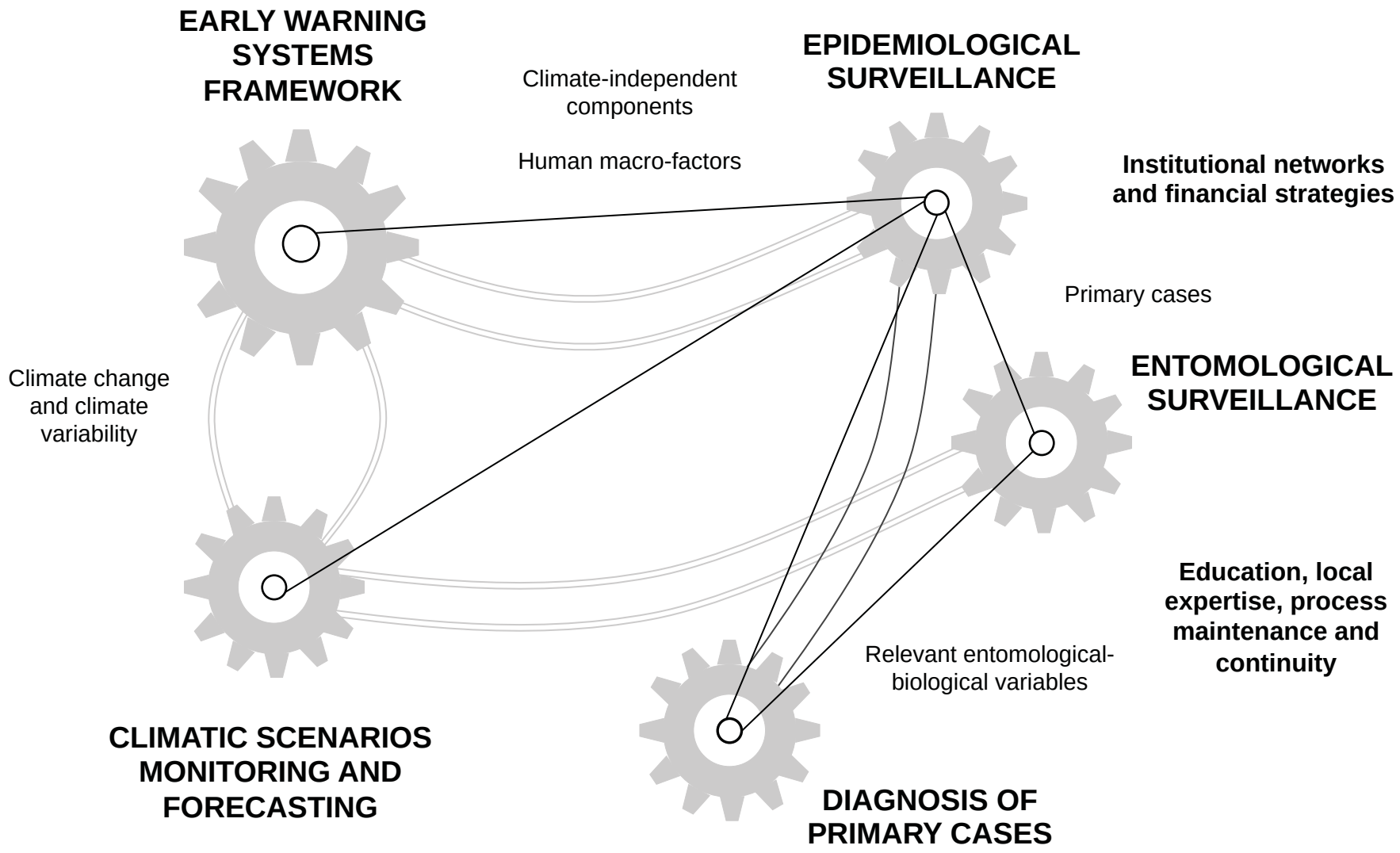
Diseases	Inter-annual variability	Sensitivity to climate	Climate variables	
Influenza	* * * * *	* *	(<T)	
Meningitis	* * * *	* * *	>T,<H (>R)	
Leishmaniasis	* *	* * *	(>T,>R)	
Loa loa	*	* * *	>R (<T)	
Cholera	* * * * *	* * * * *	(>T)	
Malaria	* * * * *	* * * * *	(>R,T,H)	
Dengue	* * * *	* * *	(>R,T,H)	

..... **gathering cumulative evidence for early and focused response.**

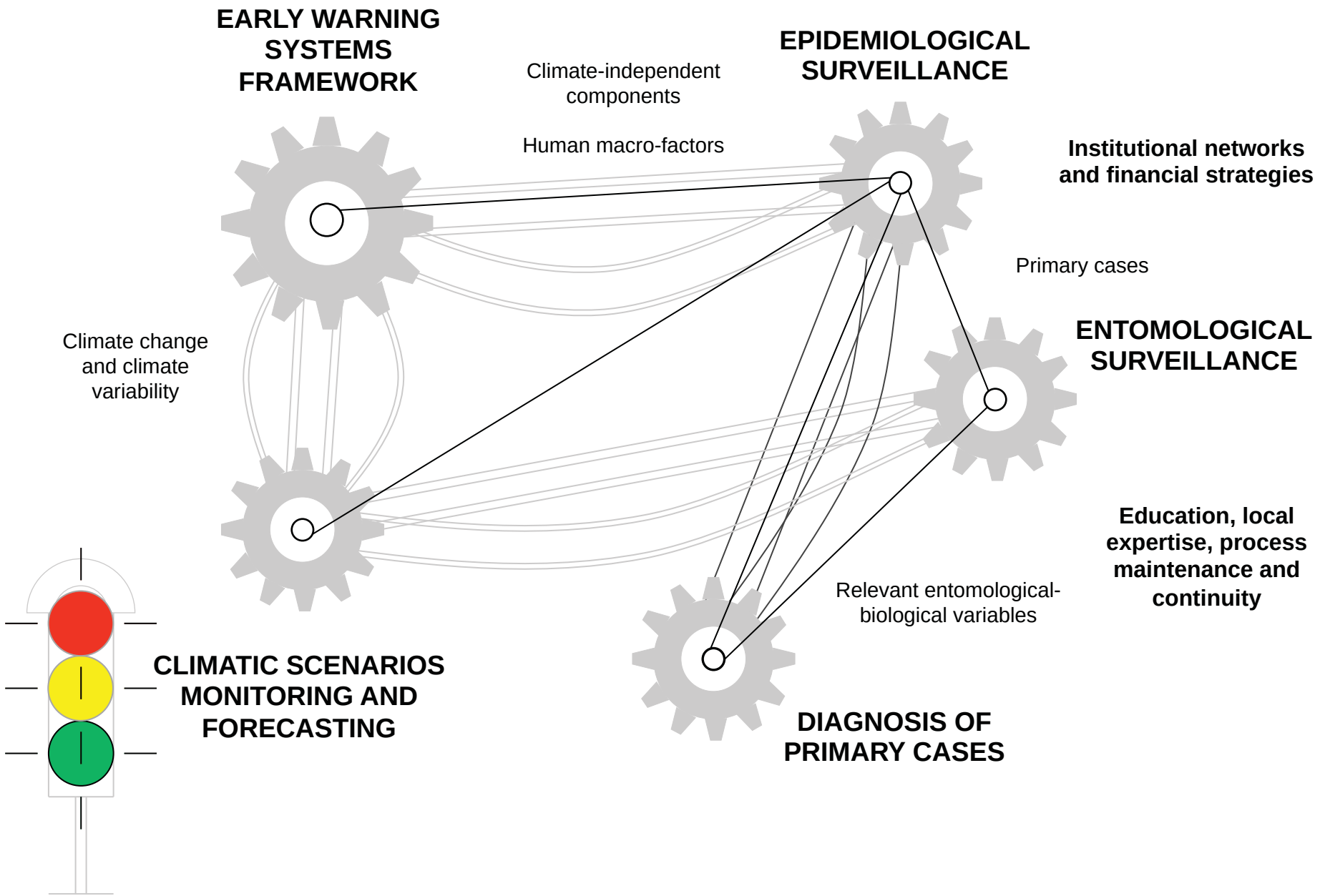


Malaria Early Warning Systems: the Rationale

INTEGRATED MALARIA SURVEILLANCE AND CONTROL SYSTEM



INTEGRATED DENGUE AND MALARIA SURVEILLANCE AND CONTROL SYSTEM



Challenges

Merge disciplines

– Public Health and climate science

Merging and finding data sources

– Disparate, disconnected sources

– Quality, long term surveillance

Interpretation of results

CC Scenarios – local conditions

Summary

Using climate and health/surveillance data together is cutting edge of public health

Be clear about how climate does and does not affect disease incidence

Need for high quality surveillance data is critical

Need more robust systems that can be used to implement preventive disease control measures

“Good surveillance does not necessarily ensure the making of the right decisions, but it reduces the chances of [making the] wrong ones.”

- *Alex Langmuir, 1963*

Thank you !

Q&A