



Newly Developed Early Warning Outbreak Recognition System (EWORS):

**REPRESENTING FIRST JOINT INDONESIAN-AMERICAN
PATENT IN SOFTWARE TECHNOLOGY**

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What is EWORS ?

EWORS is a hospital-based network of computerized linkages that provides surveillance for early detection of outbreaks of infectious diseases, by establishing trend information that distinguishes epidemic from endemic disease.

EWORS

- Provides standardized information over time for trend analysis of infectious diseases
- Provides for reliable data
- Provides for real-time data relay
- Provides for early recognition of possible outbreaks
- Provides for identification of outbreaks in both temporal and spatial clustering
- Provides for rational interpretation of data into meaningful presentations and public health response.

FLOW OF EWORS DATA COLLECTION

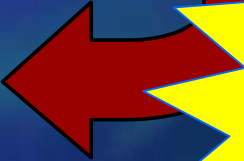


PEDIATRIC CLINIC
INTERNAL MEDICINE CLINIC
EMERGENCY ROOM

- ABDOMINAL DISCOMFORT
- ANURIA/OLIGURIA
- BLOODY COUGH
- BLOODY DIARRHEA
- BONE/MUSCLE/JOINT PAIN
- BUBO-LYMPHADENITIS
- CHILLS
- COMMON COLD
- CONJUNCTIVITIS
- COUGH
- CUTANEOUS BLEEDING
- DARK URINE
- DEHYDRATION
- DIARRHEA
- DIFFICULT BREATHING
- FEVER
- HEADACHE
- HEMATEMESIS/MELENA
- JAUNDICE
- MALaise
- MENTAL STATUS DISTURBANCE
- NAUSEA
- PARALYSIS
- RASH
- SEIZURE
- SORE THROAT
- STIFF NECK
- VESICLE/BULLAE
- VOMITING



LOCAL HOSPITALS



Monthly Reporting

NIHRD / CDC / US NAMRU-2*

** Indonesian implementation*

STANDARDIZED EWORS FORM

FORMULIR ISIAN PASIEN RSUD JAYAPURA

No Form Komputer

(diisi oleh operator)

I. Data Demografi (diisi oleh perawat)

No. Catatan Medik : _____

1. Bagian : Poli Penyakit Dalam
 Poli Anak
 Instalasi Rawat Darurat
2. Tanggal : _____ bulan: _____ tahun: _____
3. Umur : _____ tahun, _____ bulan
4. Jenis kelamin : Laki-laki Perempuan
5. Tempat tinggal (diisi salah satu)
 - a. Dalam Prop. PAPUA, Kabupaten /Kotamadya : _____
 - b. Luar Prop. PAPUA, Propinsi / Negara : _____
6. Khusus yang bertempat tinggal di Kotamadya/Kabupaten Jayapura, tempat tinggal Anda termasuk kecamatan : _____

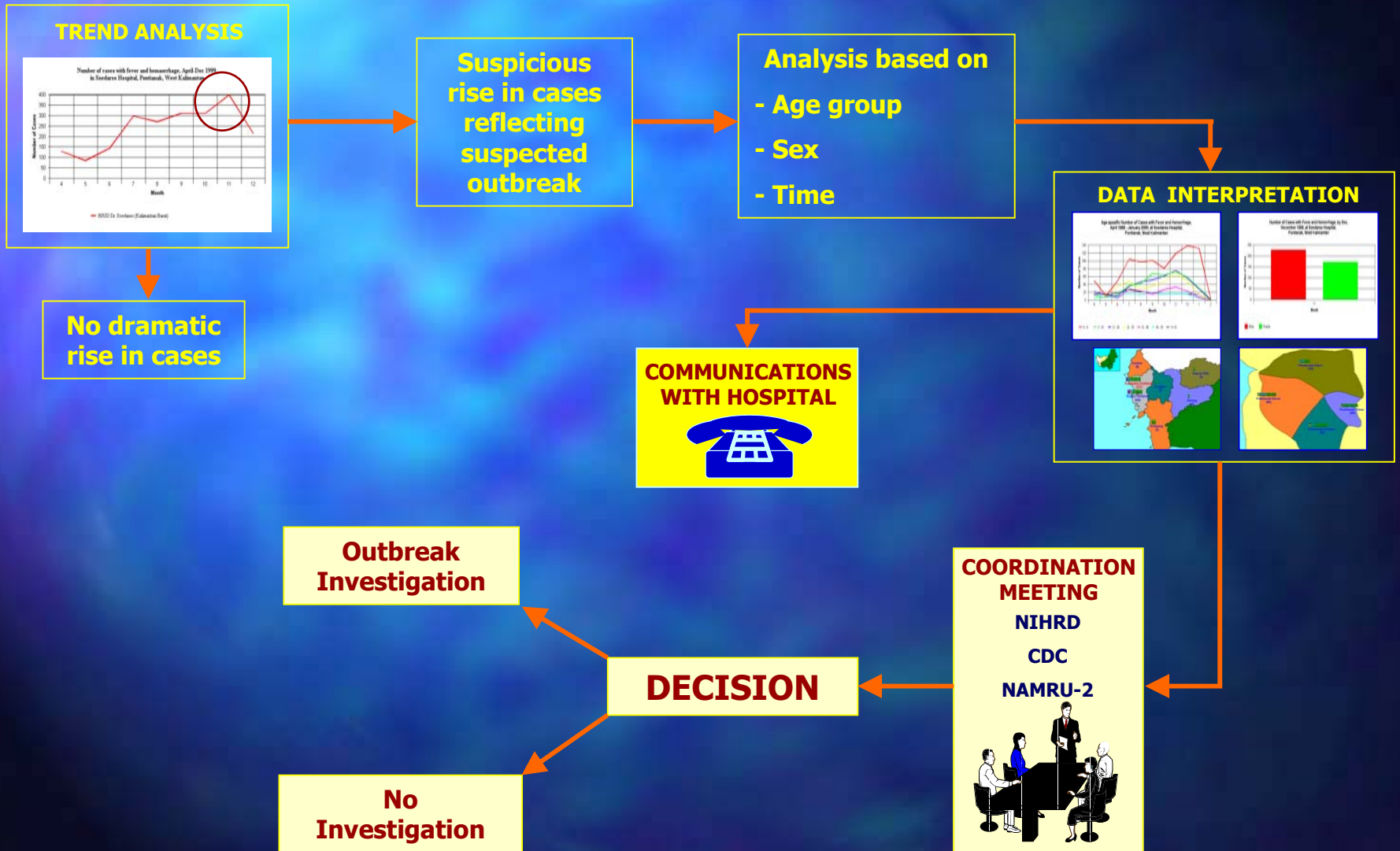
II Data Klinik (diisi oleh dokter)

Keluhan /gejala

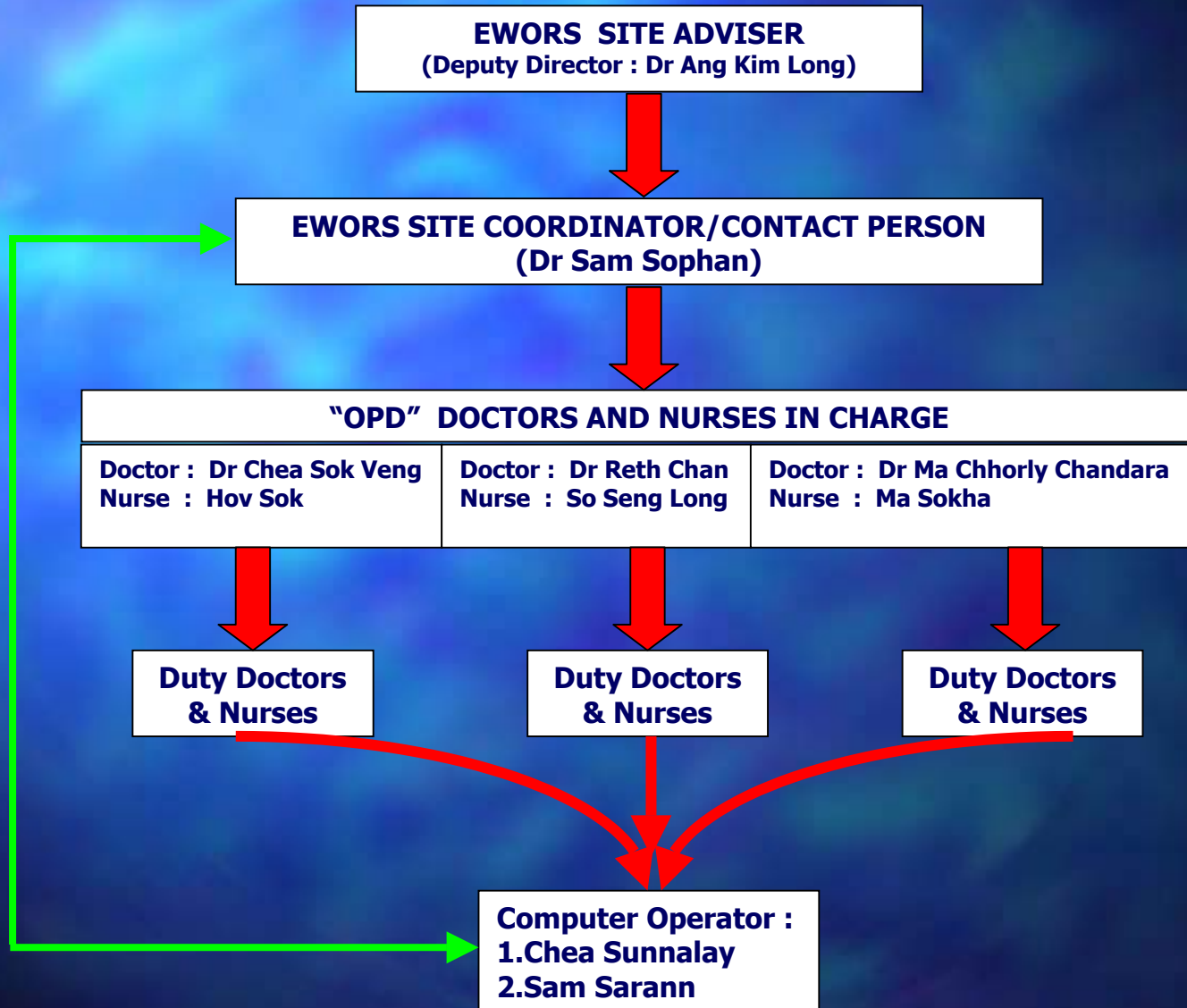
- | | |
|--|---|
| <input type="checkbox"/> Anuria/Oligouria | <input type="checkbox"/> Malaise |
| <input type="checkbox"/> Batuk | <input type="checkbox"/> Menggigil |
| <input type="checkbox"/> Batuk darah | <input type="checkbox"/> Mual |
| <input type="checkbox"/> Bubo-lymfadenitis | <input type="checkbox"/> Muntah |
| <input type="checkbox"/> Dehidrasi | <input type="checkbox"/> Perdarahan kulit |
| <input type="checkbox"/> Demam | <input type="checkbox"/> Perubahan warna urin |
| <input type="checkbox"/> Diare cair | <input type="checkbox"/> Pilek |
| <input type="checkbox"/> Diare berdarah/lendir | <input type="checkbox"/> Ruam kulit |
| <input type="checkbox"/> Gangguan kesadaran | <input type="checkbox"/> Sakit kepala |
| <input type="checkbox"/> Hematemesis/melena | <input type="checkbox"/> Sakit otot/sendai/tulang |
| <input type="checkbox"/> Ikterus | <input type="checkbox"/> Sakit perut |
| <input type="checkbox"/> Kaku kuduk | <input type="checkbox"/> Sakit tenggorokan |
| <input type="checkbox"/> Kejang | <input type="checkbox"/> Sesak nafas |
| <input type="checkbox"/> Konjunktivitis | <input type="checkbox"/> Vesikel/bullae |
| <input type="checkbox"/> Lumpuh | |

Diagnosis sementara yang dipakai sebagai dasar pengobatan _____

Decisional Flow Diagram



EWORS ORGANIZATION AT EWORS SITE *



ORGANIZATION OF CURRENT EWORS NETWORK

INDONESIA



EWORS HOSPITAL NETWORK IN INDONESIA, 1998 - 2001

- 1. RSUD Sanglah, Denpasar, Bali.**
- 2. RS Labuang Baji, Makassar, Sulawesi Selatan.**
- 3. RSUD Dr Soedarso, Pontianak, Kalimantan Barat.**
- 4. RS Dr Pirngadi, Medan.**
- 5. RS Persahabatan, Jakarta.**
- 6. RS Penyakit Infeksi Prof. Dr. Sulianti Saroso, Jakarta.**
- 7. RSUD Jayapura, Jayapura, Papua.**
- 8. RSUD Wamena, Wamena, Papua**
- 9. RS Dr Sardjito, Yogyakarta**

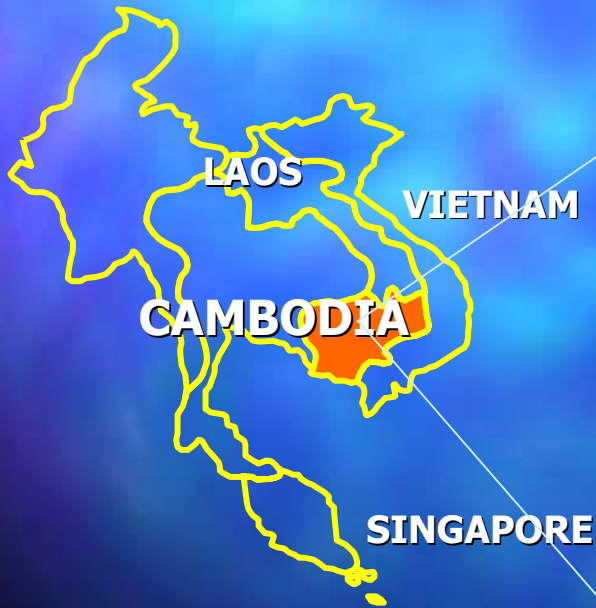
Proposed EWORS Network

FIVE YEAR PLAN



ORGANIZATION OF CURRENT EWORS NETWORK

CAMBODIA



FLOW OF EWORS DATA IN CAMBODIA

Preah Ket Mealea Hospital (Military Hospital),
Phnom Penh

Pediatric Hospital, Phnom Penh



SITE COMPUTERS

Kampong Siem Kampong Cham Referral
Hospital, Kampong Cham Province

HOST / SERVER



**National Institute of Public Health,
Phnom Penh**



ORGANIZATION OF CURRENT EWORS NETWORK

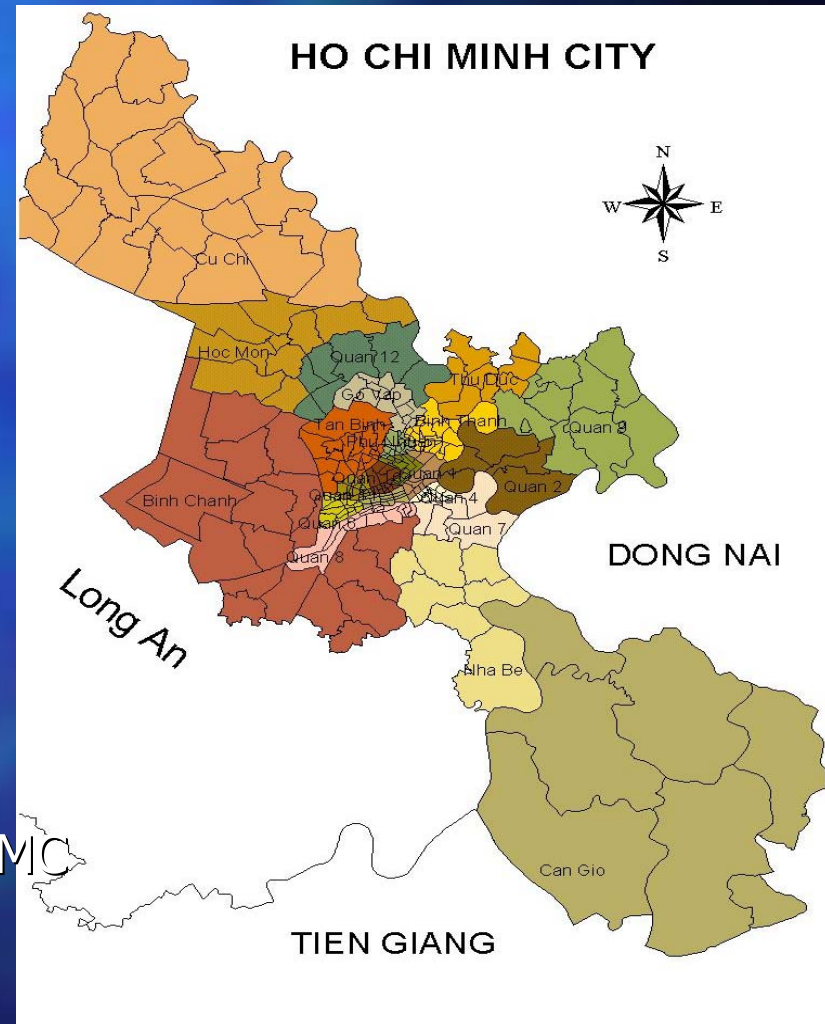
REPUBLIC SOCIALIST OF VIETNAM

EWORS HOST :

- The Pasteur Institute, Ho Chi Minh City

EWORS SITES:

- Pediatric Hospital #1, HCMC
- Pediatric Hospital #2, HCMC
- Center of Tropical Disease Hospital, HCMC



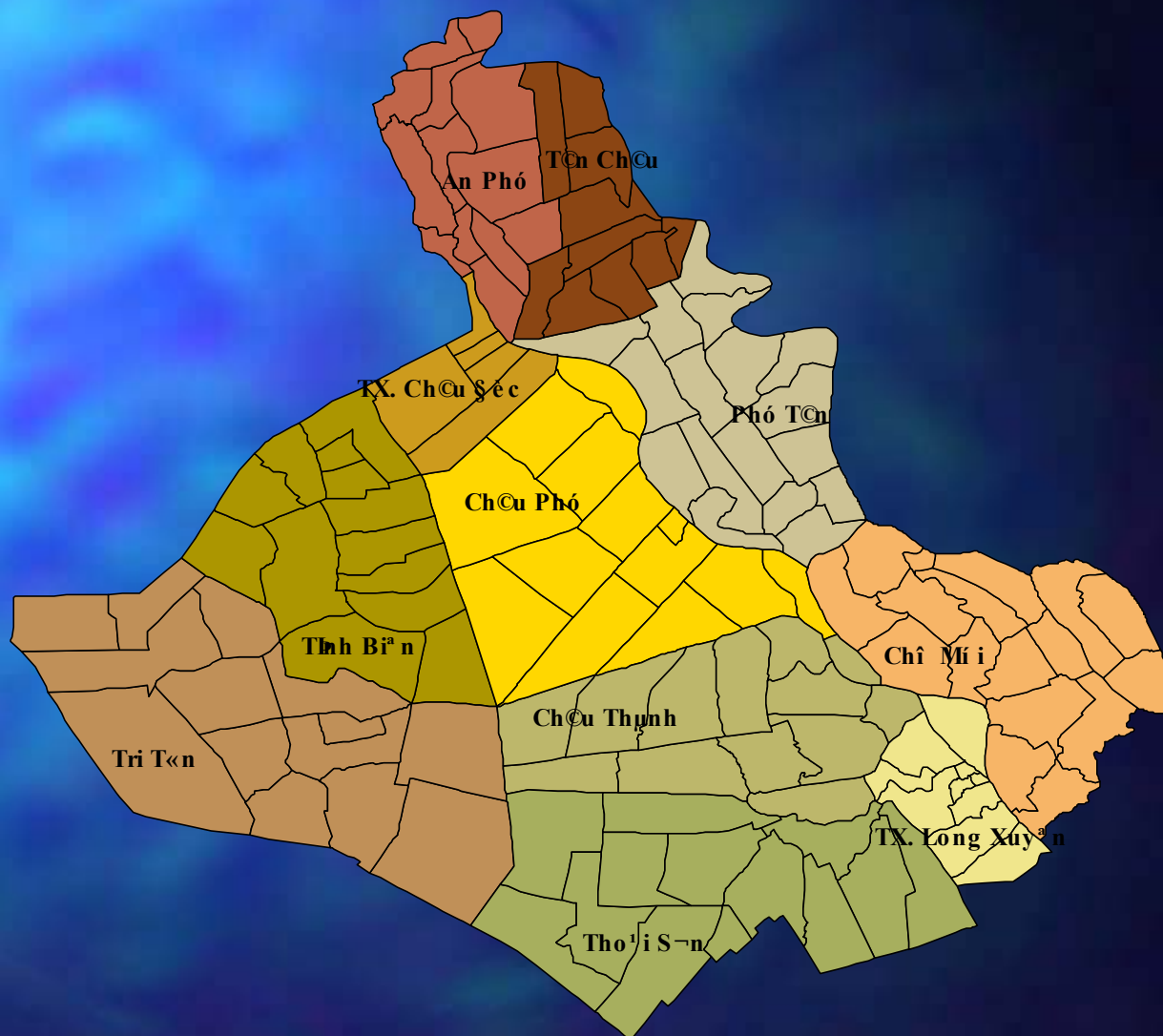
AN GIANG PROVINCE, VIETNAM

EWORS SITES :

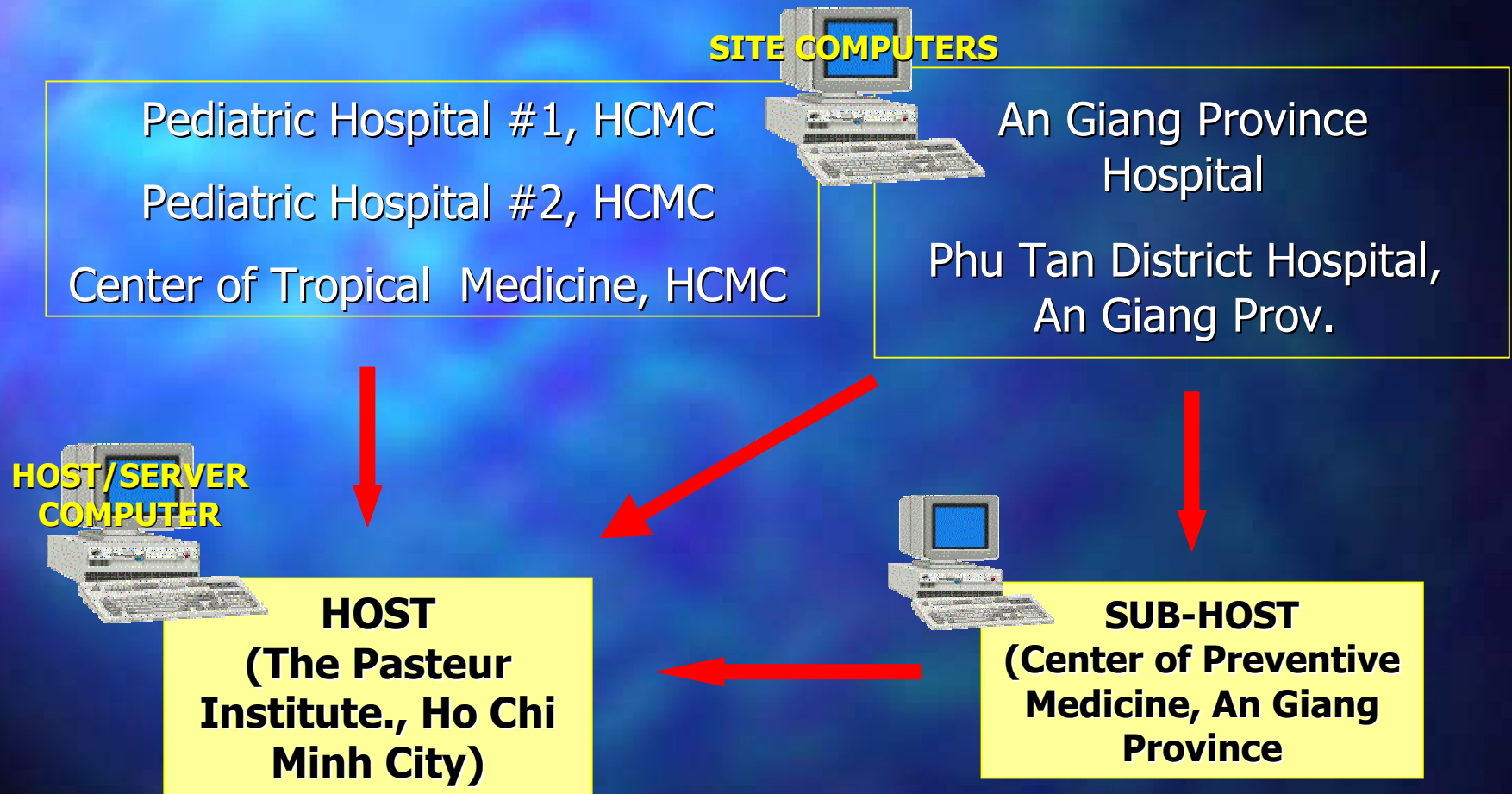
An Giang Province
Hospital

Phu Tan District
Hospital

Center of Preventive
Medicine, An Giang
Province (*Sub-host*)



FLOW OF EWORS DATA IN VIETNAM



- Form # 13656

File Edit View Record Help

Hospital Name: RSUP Persahabatan Operator: OPR
Unit Name: Unit Gawat Darurat Form Date: 28/11/00
Medical Record #: 2811001420 Send Date: 28/11/00

Demographic Data

Location: [v] District: Kod. Jakarta Selatan
Sub-District: Kebayoran Lama
Village: Pejaten

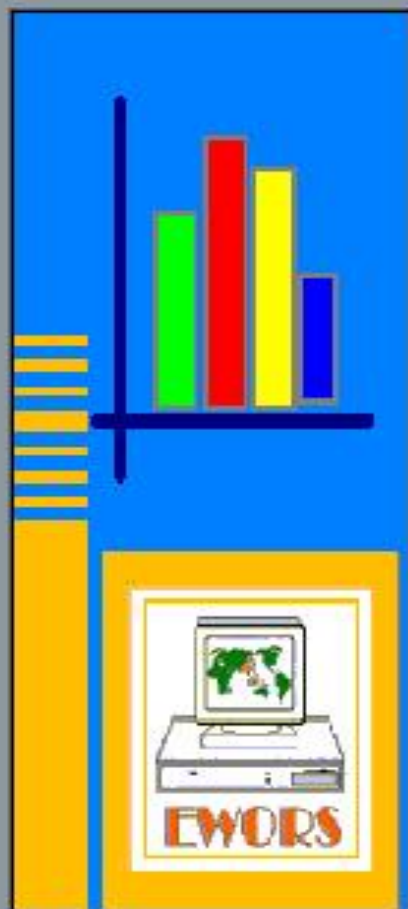
Age (Year): 1
Age (Month): 11

Gender:
 Male
 Female

Symptoms	Diagnosis
<input checked="" type="checkbox"/> Abdominal discomfort	<input type="checkbox"/> Fever
<input type="checkbox"/> Anuria / oliguria	<input type="checkbox"/> Headache
<input type="checkbox"/> Bloody cough	<input type="checkbox"/> Hematemesis / melena
<input type="checkbox"/> Bloody diarrhea	<input type="checkbox"/> Jaundice
<input type="checkbox"/> Bone / muscle / joint pain	<input type="checkbox"/> Malaise
<input type="checkbox"/> Bubo-lymphadenitis	<input type="checkbox"/> Mental status disturbances
<input type="checkbox"/> Chills	<input type="checkbox"/> Nausea
<input type="checkbox"/> Common cold	<input type="checkbox"/> Paralysis

EWORS data entry

EWORS Chart Wizard - Step 2



You can limited data to analyze by using Time Frame, Age, and Sex. Please select from options below:

Use Time Range :

From:

28/ Okt /2000

To:

28/ Nop /2000

Only selected Sex below:

Male

Female

Customized Age grouping

All ages with Default Range

User Defined, From:

0

To:

99

From:

0

-

4

5

-

9

10

-

19

20

-

29

30

-

39

40

-

49

n

>=

50

Help

Cancel

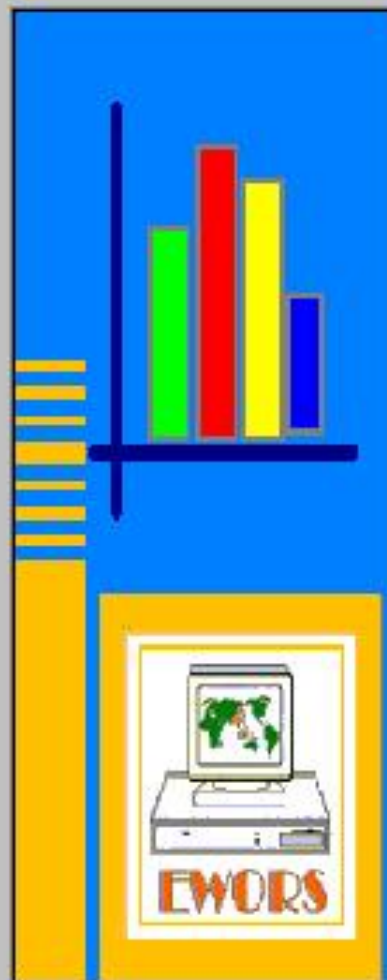
< Back

Next >

Finish

EWORS key function analysis of selected variables

EWORS Chart Wizard - Step 3



Determine Primary and Additional (If needed) Signs/Symptoms from these following list boxes:

Primary Sign/Symptoms

- Anuria / oliguria
- Cough
- Bloody cough
- Bubo-lymphadenitis
- Dehydration
- Fever
- Bloody diarrhea
- Diarrhea
- Mental status disturbances
- Hematemesis / melena
- Jaundice
- Stiff neck
- Seizures
- Conjunctivitis
- Paralysis
- Malaise
- Chills

Select All

Clear

Additional Sign/Symptoms

- Anuria / oliguria
- Cough
- Bloody cough
- Bubo-lymphadenitis
- Dehydration
- Bloody diarrhea
- Diarrhea
- Mental status disturbances
- Hematemesis / melena
- Jaundice
- Stiff neck
- Seizures
- Conjunctivitis
- Paralysis
- Malaise
- Chills

None

Select All

Clear

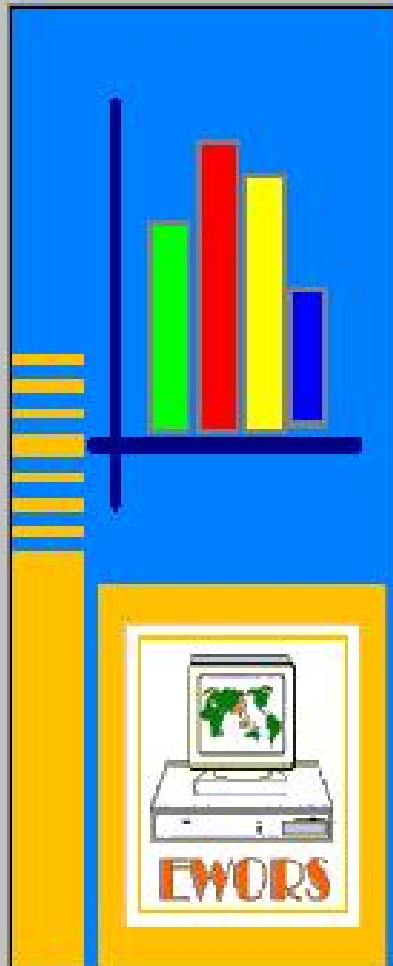
Cancel

< Back

Next >

Finish

EWORS Chart Wizard - Step 4



This step show you possible diseases that appear from Primary and Additional Sign/Symptoms that you choosed in previous step.

- Anthrax**
- Brucellosis
- Measles
- Chickungunya
- Yellow Fever
- Lassa Fever
- Dengue Hemorrhagic Fever
- Diphtheria
- Ebola
- Enterotoxigenic E Coli
- Hantaan
- Hepatitis A-E

ANTHRAX

- IN SOUTHEAST ASIA**
- NOT YET IN SOUTHEAST ASIA**

Sign/Symptom:

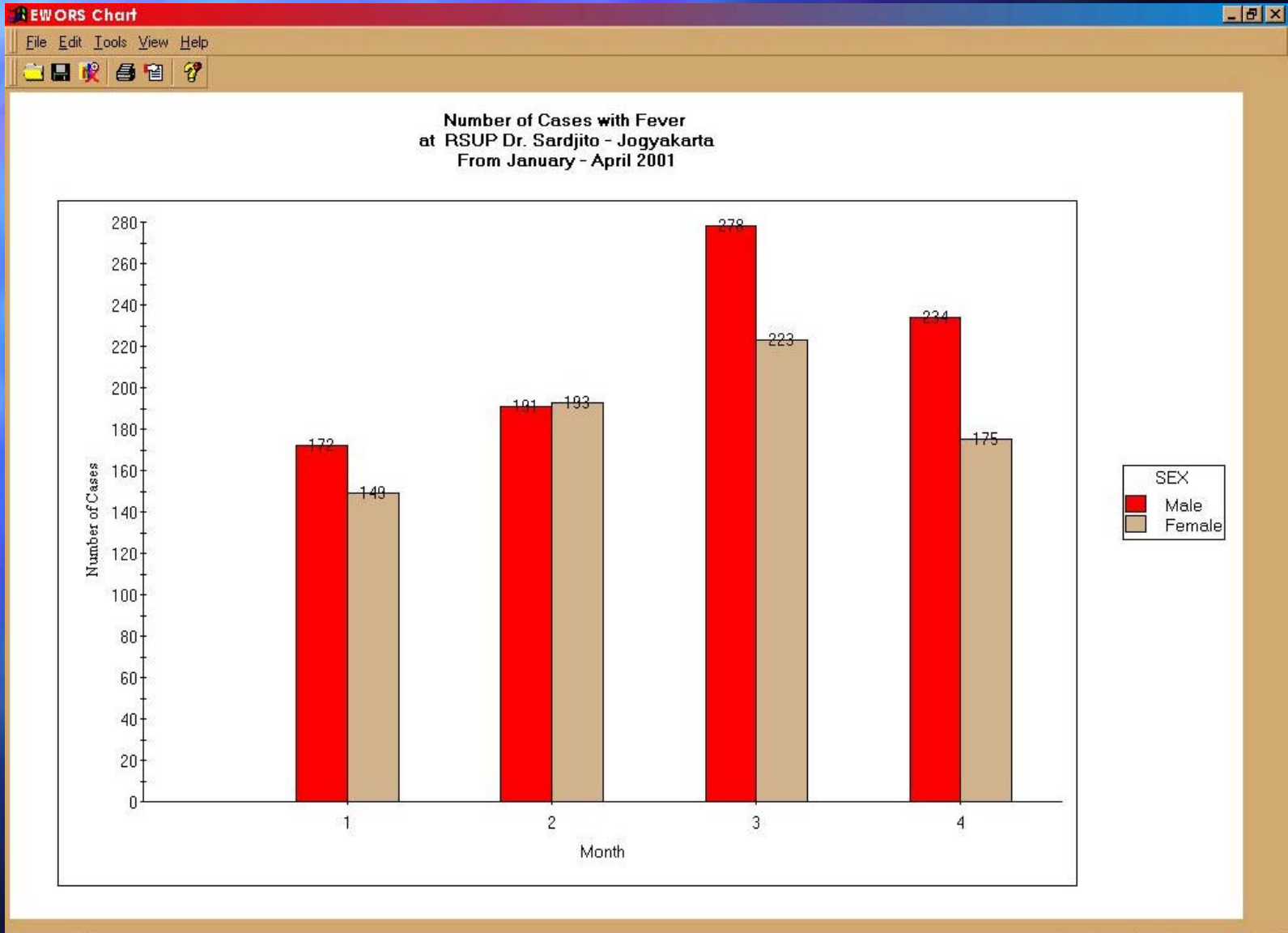
- a. Vesicle / bullae
- b. Fever

Cancel

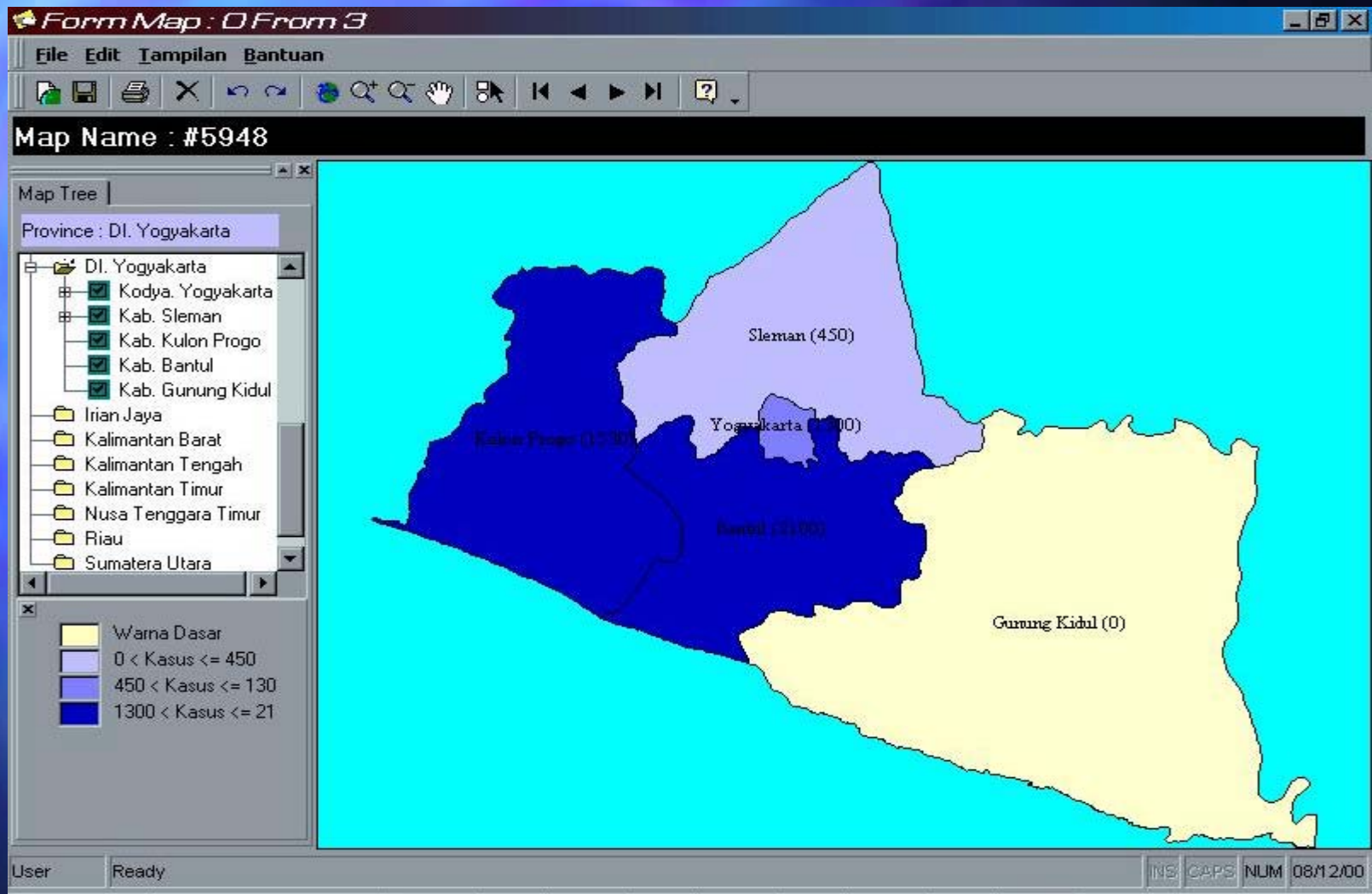
< Back

Next >

Finish



EWORS graphics presentation



EWORS provides for key function mapping for each site location in identifying geographic clustering of outbreak cases

Map Name # DI Yogyakarta

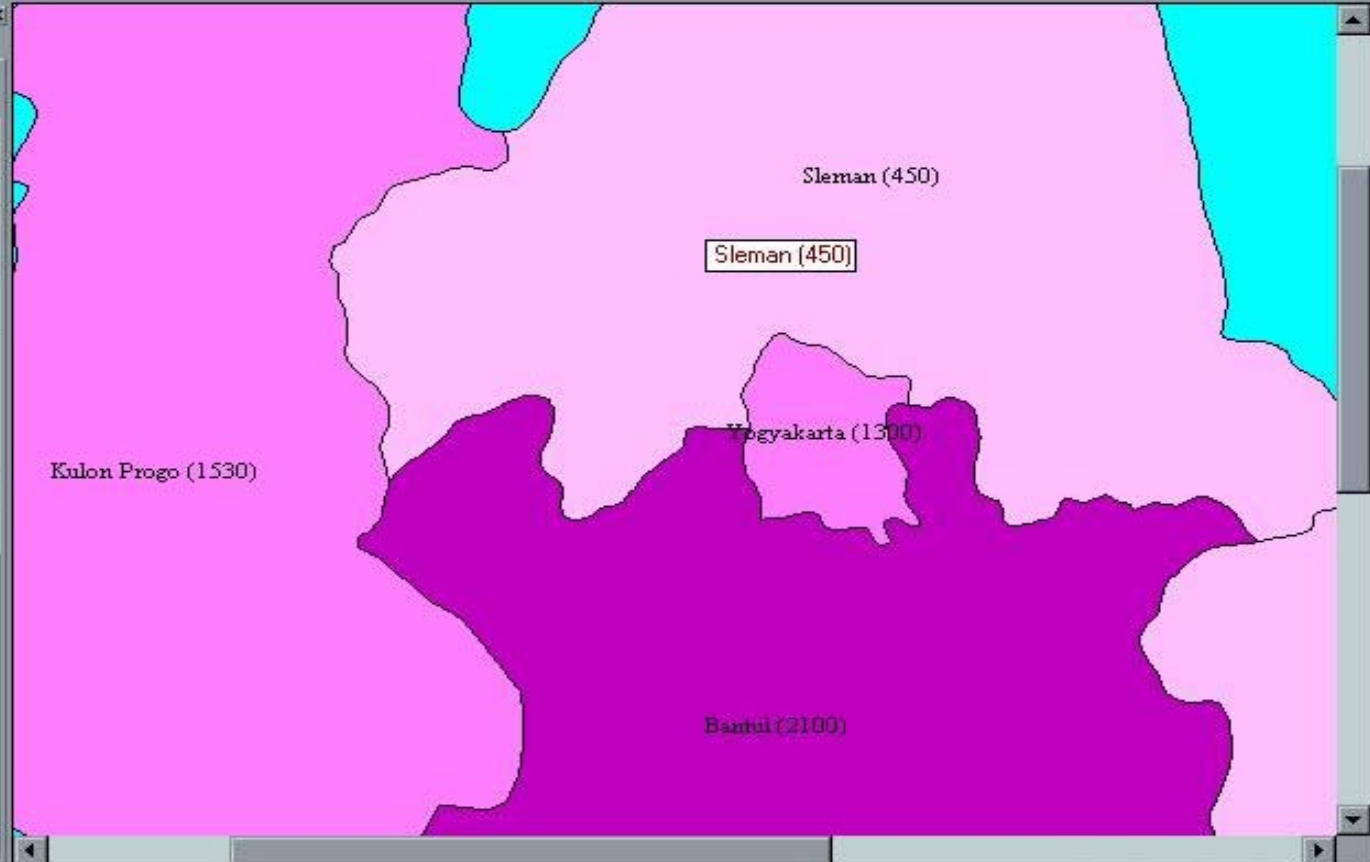
Map Tree

Province : DI. Yogyakarta

- DI. Yogyakarta
 - Kodya. Yogyakarta
 - Kab. Sleman
 - Kab. Kulon Progo
 - Kab. Bantul
 - Kab. Gunung Kidul
- Irian Jaya
- Kalimantan Barat
- Kalimantan Tengah
- Kalimantan Timur
- Nusa Tenggara Timur
- Riau
- Sumatera Utara

Legend

- Warna Dasar
- 0 < Kasus <= 500
- 500 < Kasus <= 153
- 1530 < Kasus <= 21



Data Transformator

Data Criteria

Unsent Data
 Sent Data
 Both

List of Data

No	Form No.	Date	Entered By	Sending Date
0001	R01/01/1999/00001	02 Januari 1...	denpasar1	23 Februari ...
0002	R01/01/1999/00002	02 Januari 1...	denpasar1	23 Februari ...
0003	R01/01/1999/00003	02 Januari 1...	denpasar1	23 Februari ...
0004	R01/01/1999/00004	02 Januari 1...	denpasar1	23 Februari ...
0005	R01/01/1999/00005	02 Januari 1...	denpasar1	23 Februari ...
0006	R01/01/1999/00006	02 Januari 1...	denpasar1	23 Februari ...
0007	R01/01/1999/00007	02 Januari 1...	denpasar1	23 Februari ...
0008	R01/01/1999/00008	02 Januari 1...	denpasar1	23 Februari ...
0009	R01/01/1999/00009	02 Januari 1...	denpasar1	23 Februari ...
0010	R01/01/1999/00010	02 Januari 1...	denpasar1	23 Februari ...
0011	R01/01/1999/00011	02 Januari 1...	denpasar1	23 Februari ...
0012	R01/01/1999/00012	02 Januari 1...	denpasar1	23 Februari ...
0013	R01/01/1999/00013	02 Januari 1...	denpasar1	23 Februari ...
0014	R01/01/1999/00014	02 Januari 1...	denpasar1	23 Februari ...
0015	R01/01/1999/00015	02 Januari 1...	denpasar1	23 Februari ...
0016	R01/01/1999/00016	02 Januari 1...	admin	23 Februari ...
0017	R01/01/1999/00017	02 Januari 1...	denpasar1	23 Februari ...
0018	R01/01/1999/00018	02 Januari 1...	denpasar1	23 Februari ...
0019	R01/01/1999/00019	02 Januari 1...	denpasar1	23 Februari ...
0020	R01/01/1999/00020	02 Januari 1...	denpasar1	23 Februari ...
0021	R01/01/1999/00021	02 Januari 1...	denpasar1	23 Februari ...

Total of Records : 3202

Send via :

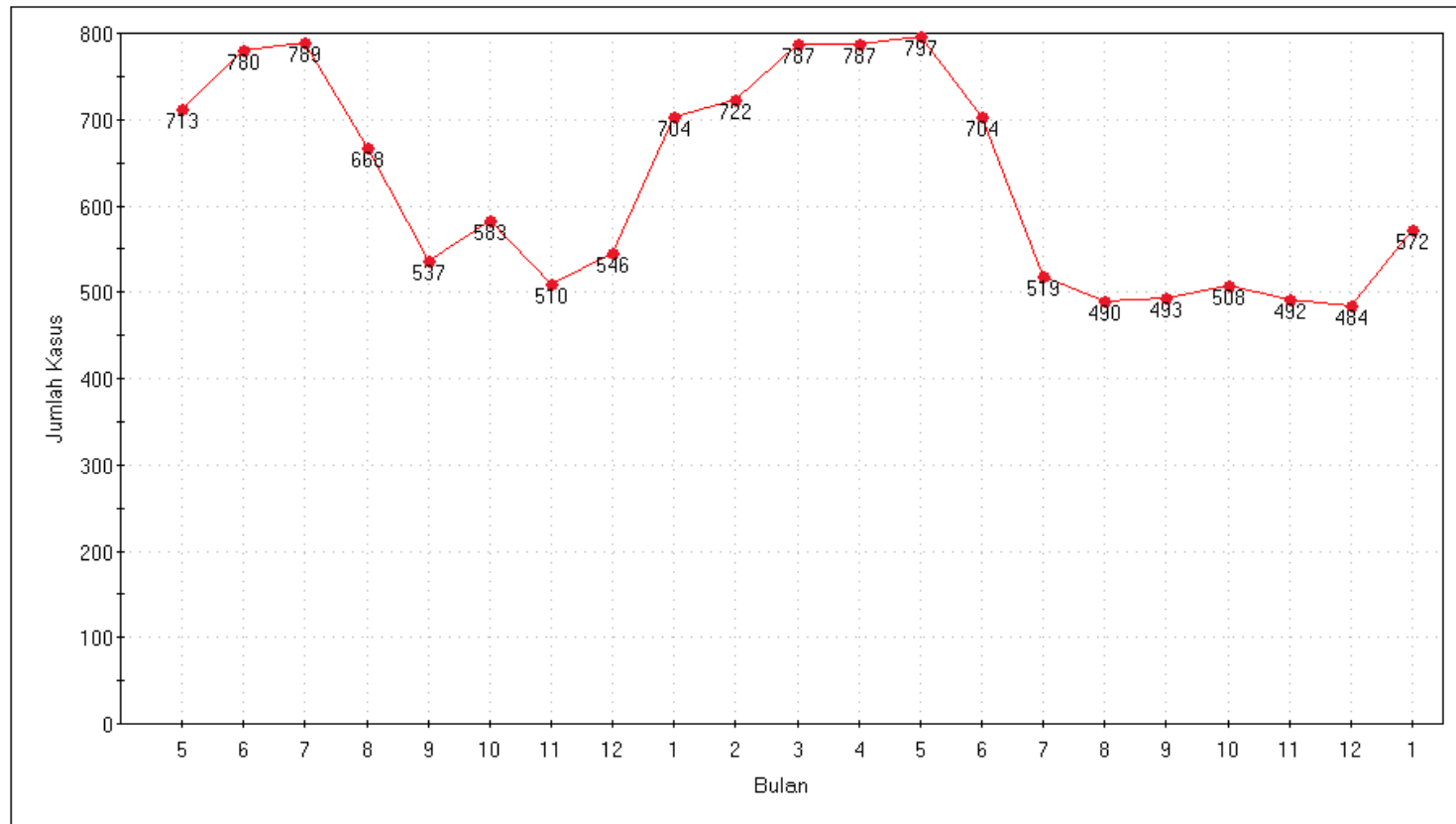
EWORS database can be analyzed off line using other statistical programs

RECENT EXAMPLE

**EWORS depicted raise of diarrheal cases
in North Jakarta, 1 – 22 January 2002**

Fluctuation of fever by month , 1 May 2000 through 23 January 2001 at the Infectious Diseases Hospital, North Jakarta

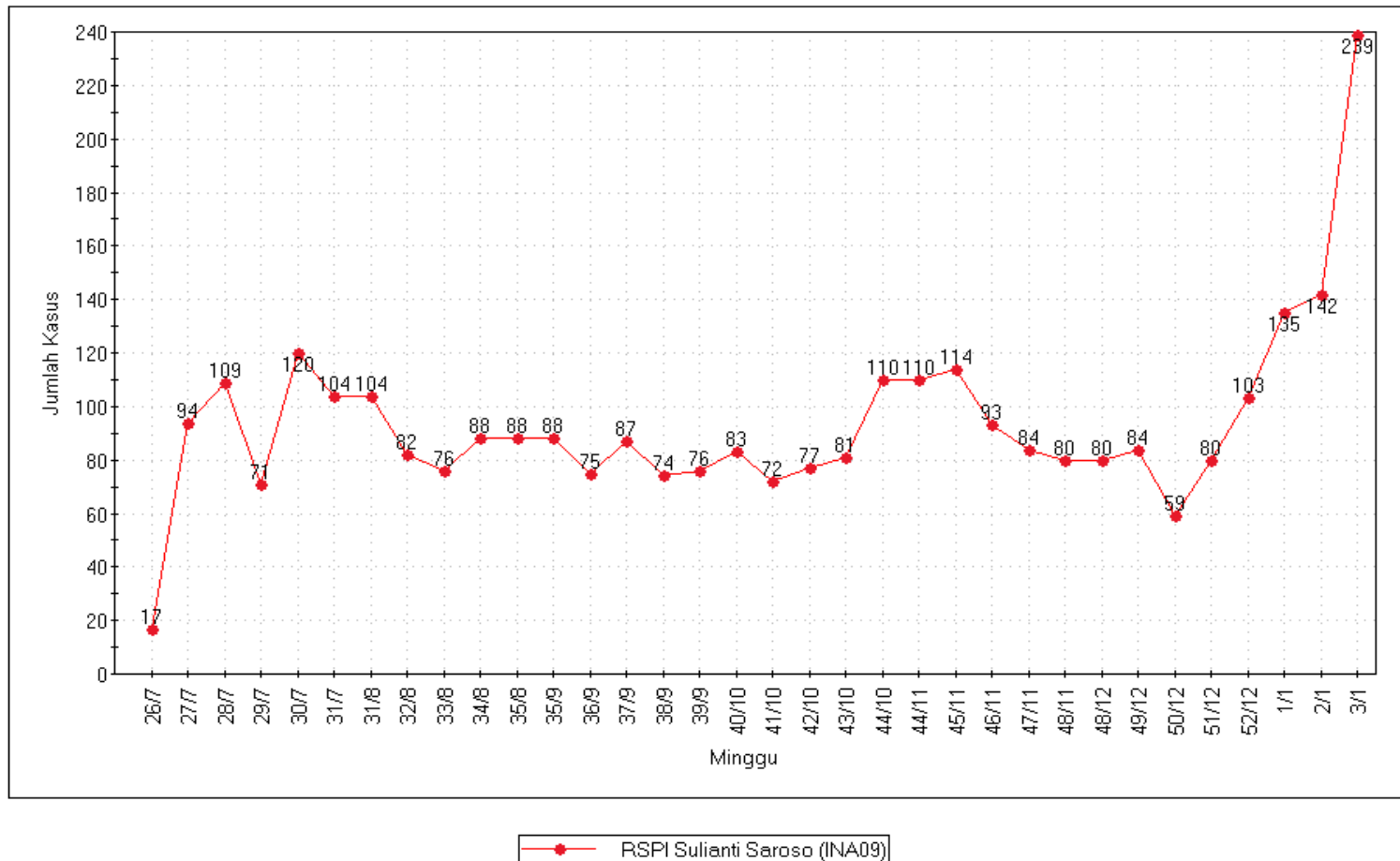
Demam, 1 Mei 2000 s/d 23 Januari 2002



RSPI Sulianti Saroso (INA09)

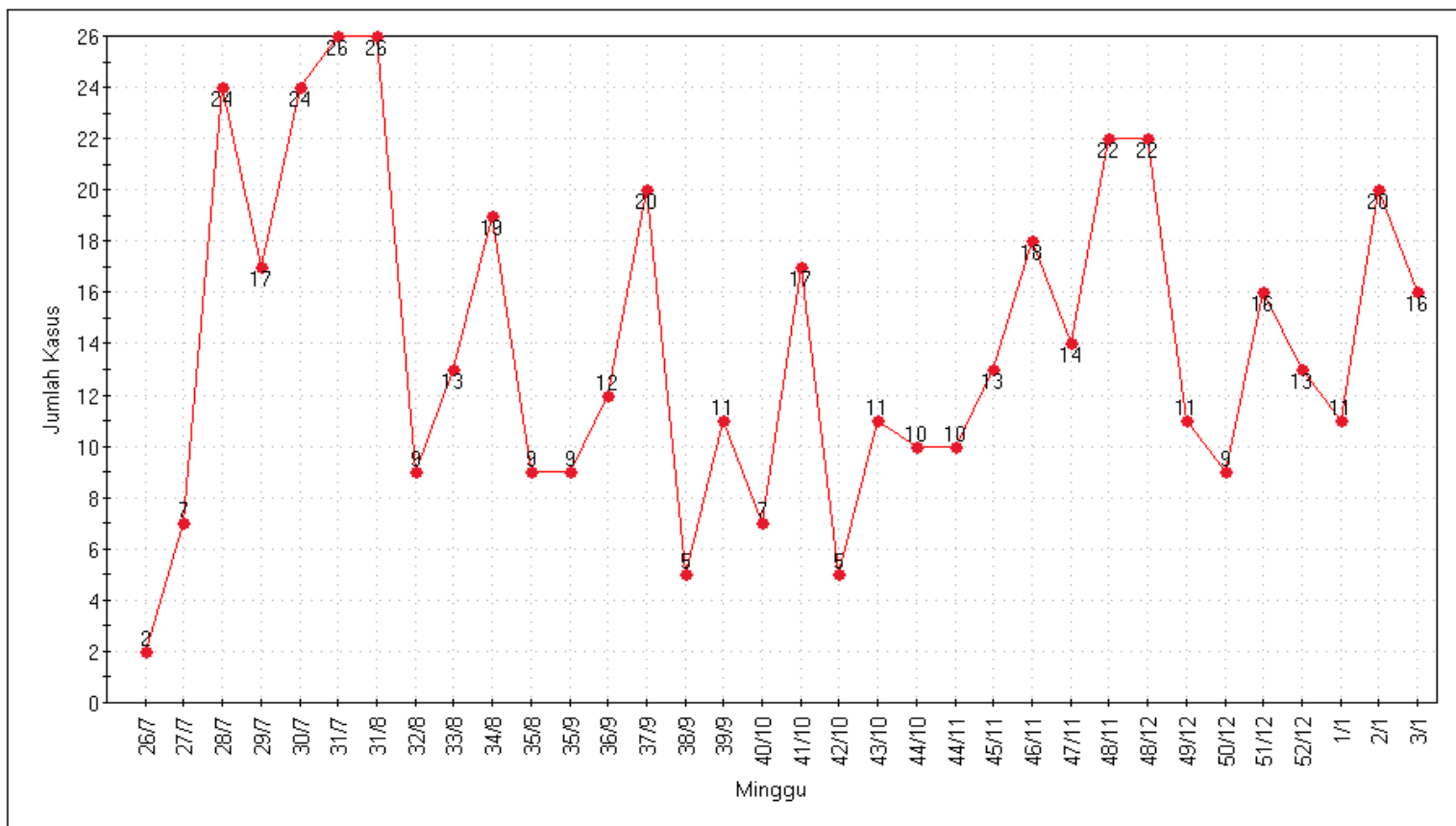
Fluctuation of watery diarrhea by week, 1 July 2001 through 23 January 2002 at the Infectious Diseases Hospital, North Jakarta

Diare Cair, 1 Juli 2001 s/d 23 Januari 2002



Fluctuation of watery diarrhea and dehydration by week, 1 July 2001 through 23 January 2002 at the Infectious Diseases Hospital, North Jakarta

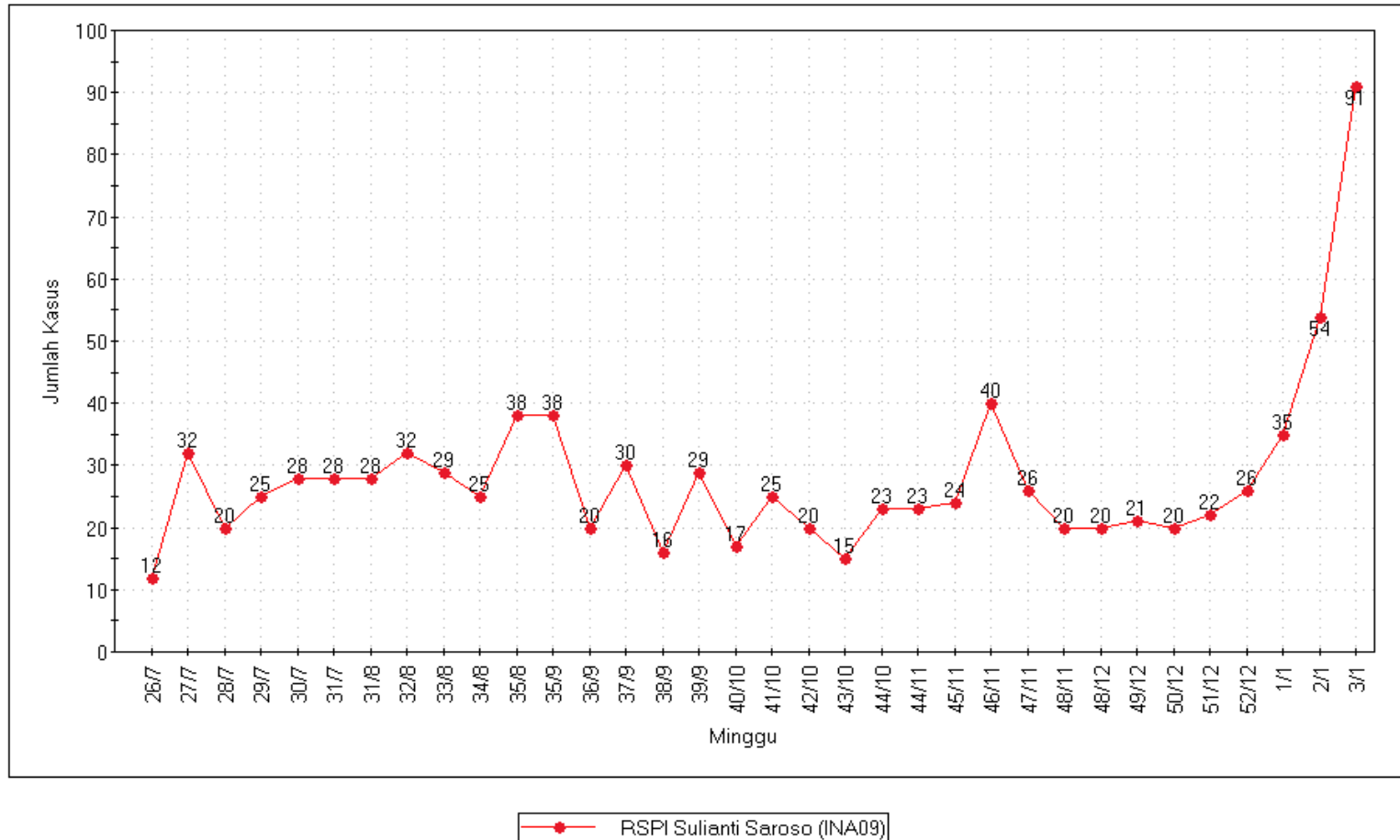
Diare Cair dan Dehidrasi, 1 Juli 2001 s/d 23 Januari 2002



—●— RSPI Sulianti Saroso (INA09)

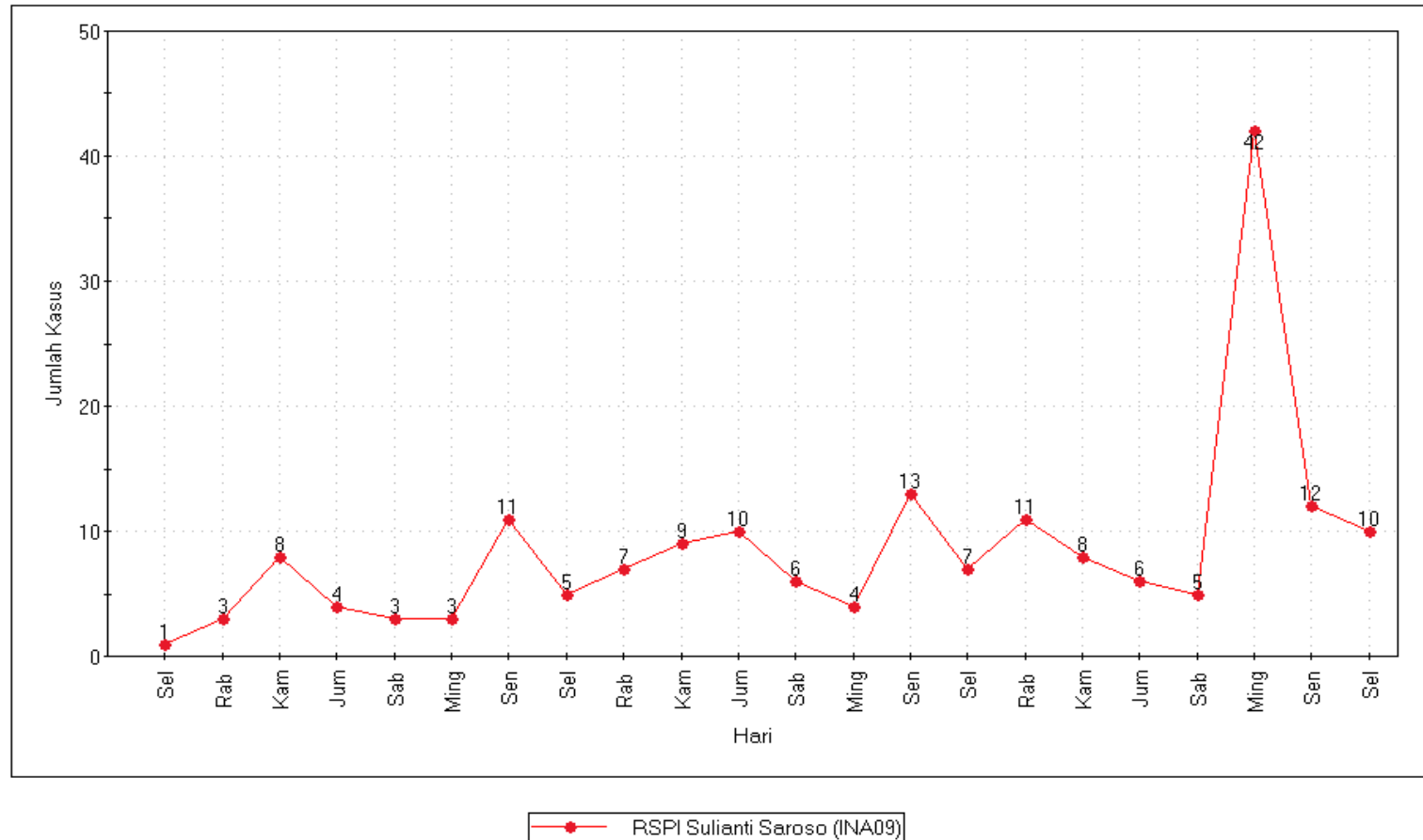
Fluctuation of watery fever, diarrhea and vomiting, by week, 1 July 2001 through 22 January 2002 at the Infectious Diseases Hospital, North Jakarta

Jumlah Kasus #1:Demam, #1:Diare Cair, dan #1:Muntah
1 Juli 2001 s/d 22 Januari 2002



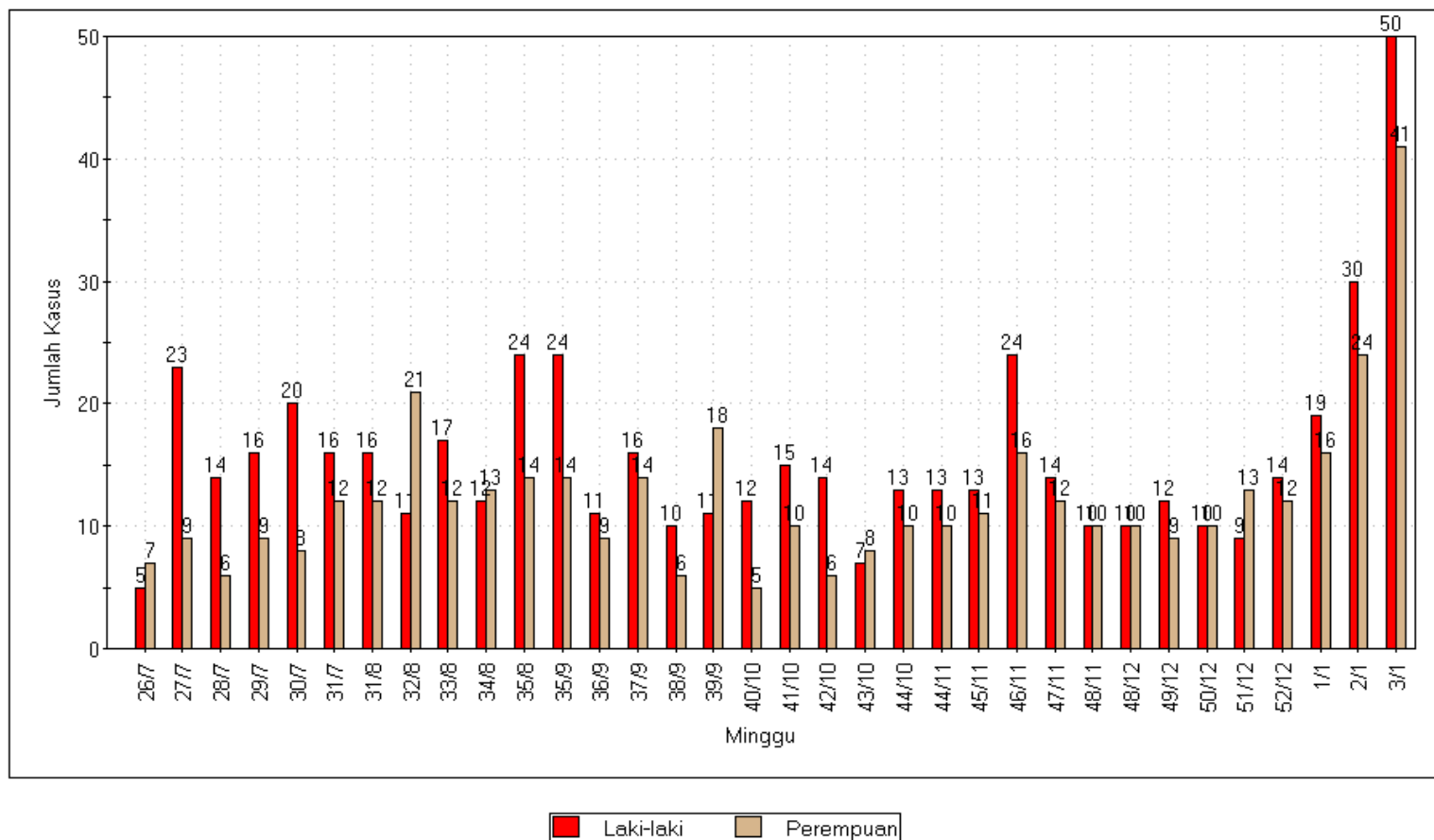
Fluctuation of watery fever, diarrhea and vomiting, by day, 1 January through 22 January 2002 at the Infectious Diseases Hospital, North Jakarta

Jumlah Kasus #1:Demam, #1:Diare Cair, dan #1:Muntah
1 - 22 Januari 2002



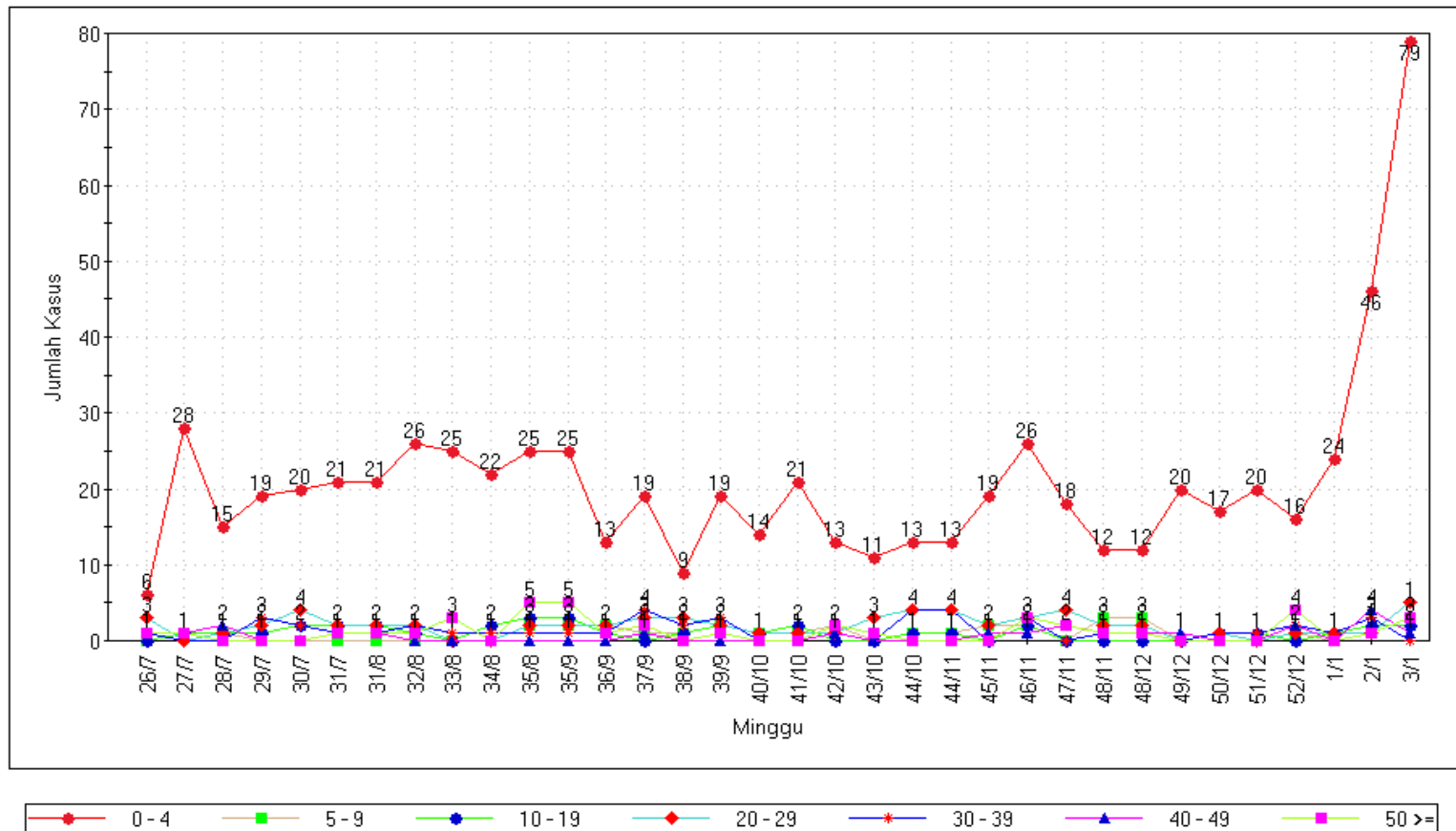
Fluctuation of watery fever, diarrhea and vomiting, by sex, 1 July 2001 through 22 January 2002 at the Infectious Diseases Hospital, North Jakarta

Jumlah Kasus #1: Demam, #1: Diare Cair, dan #1: Muntah
1 Juli 2001 s/d 22 Januari 2002
Menurut Jenis Kelamin

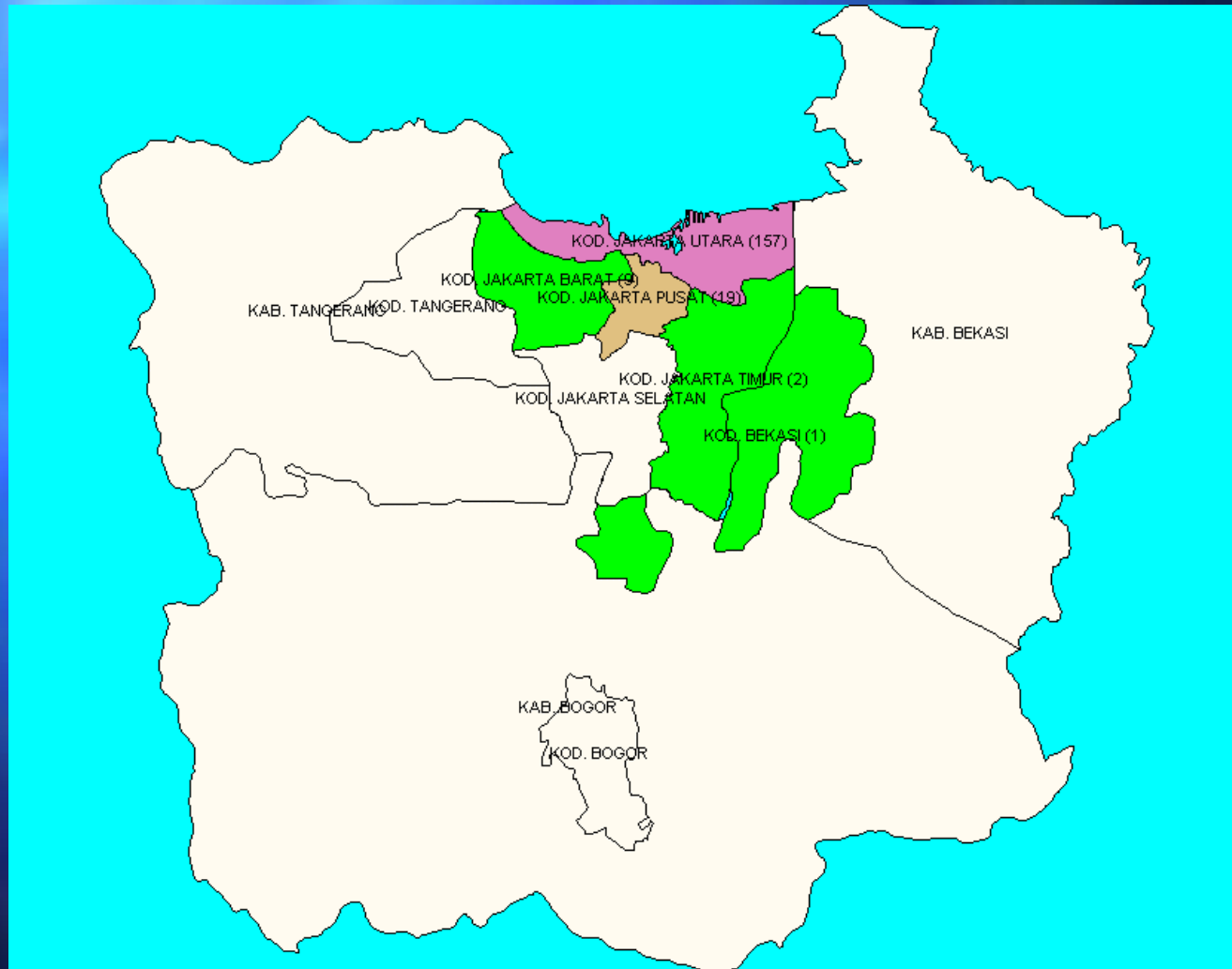


Fluctuation of watery fever, diarrhea and vomiting, by age, 1 July 2001 through 22 January 2002 at the Infectious Diseases Hospital, North Jakarta

Jumlah Kasus #1: Demam, #1: Diare Cair, dan #1: Muntah
1 Juli 2001 s/d 22 Januari 2002
Menurut Umur

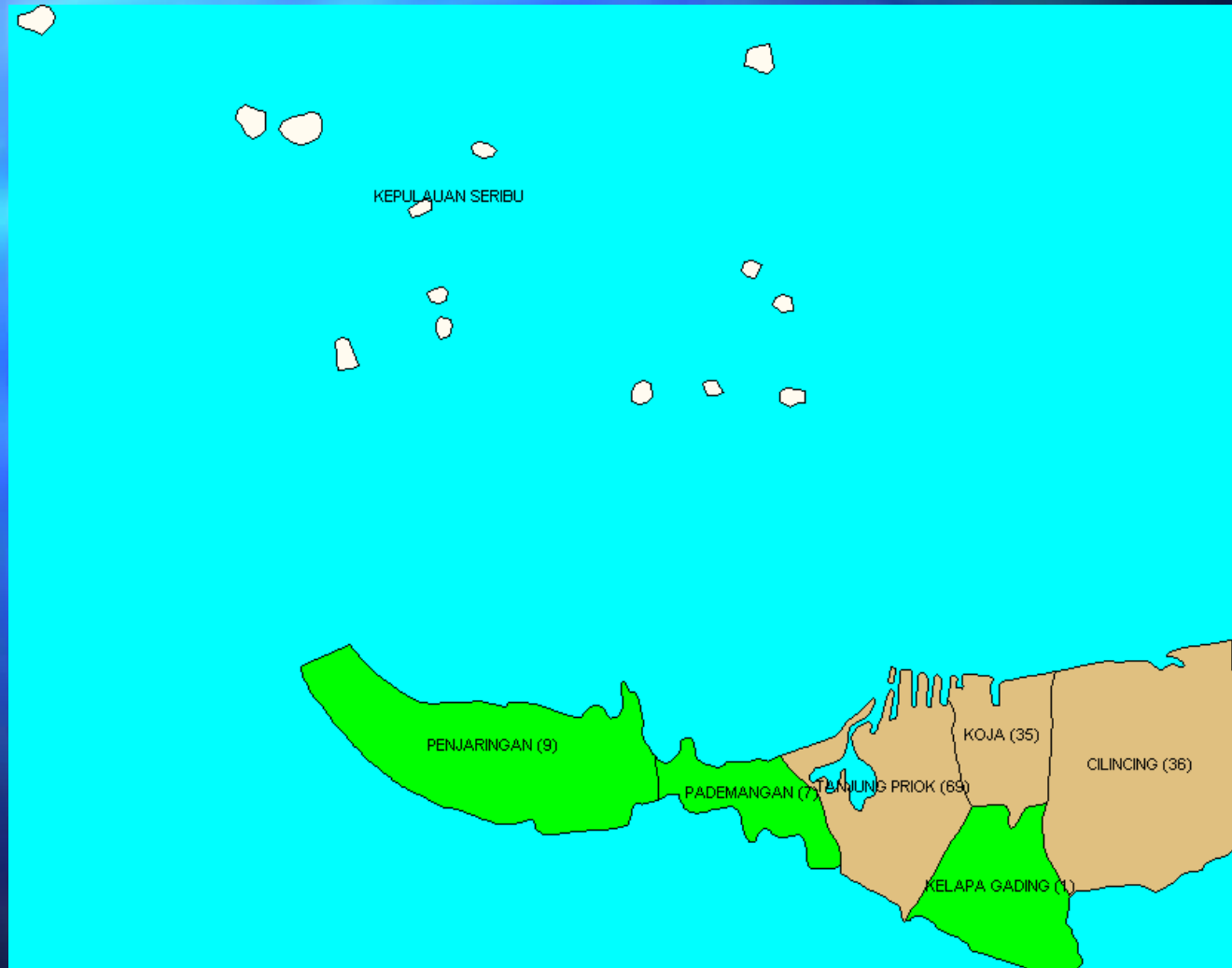


Geographical Clustering of Cases with Fever, Watery diarrhea, and Vomiting, 1 – 22 January 2002, in North Jakarta *



* EWORS data derived from Infectious Diseases Hospital, North Jakarta.

Geographical Clustering of Cases with Fever, Watery diarrhea, and Vomiting, 1 – 22 January 2002, by sub-district, in North Jakarta *



* EWORS data derived from Infectious Diseases Hospital, North Jakarta.

What EWORS IS :

- EWORS collects standardized data for making area-specific and regional comparisons.
- The EWORS concept is predicated on “same day” transfer of information from network hospitals to a central hub.

What EWORS IS :

- EWORS employs a syndromic approach to a working diagnosis, which allows for reliable analysis of aggregate data to determine appropriate response measures.
- EWORS reporting insures recognition of an incipient epidemic, by detecting similar signs and symptoms in the index and early cases associated with the same outbreak.

THE IMPLEMENTATION OF EWORS



EWORS study site at Dr Pirngadi Hospital,
Medan, North Sumatra



Initial data entry into standardized EWORS form: nurse at Dr Pirngadi Hospital, Medan interviews patient.



Data entry into specially designed EWORS software in Medan.

What EWORS is NOT :

- **EWORS does not represent a conventional system for disease surveillance, with a focus on specific etiology.**

Most reporting systems involve data transfer from district to provincial to national levels over months or years, for inclusion in large disease-specific compilations used for national or international historical reports.

Validation of EWORS

- Over 500,000 case entries in less than 2 years of pilot implementation in Indonesia, Cambodia and Vietnam.
- Four instances of response in recognition of outbreak occurrence.

Future EWORS Applications

- Refugee and Disaster Situations
- Regional component of WHO Global Network
- Biological Defense
- Palmtop platform