



Epidemiologi Bencana

Hari Kusnanto – Prodi S2 IKM UGM

Persoalan Epidemiologi



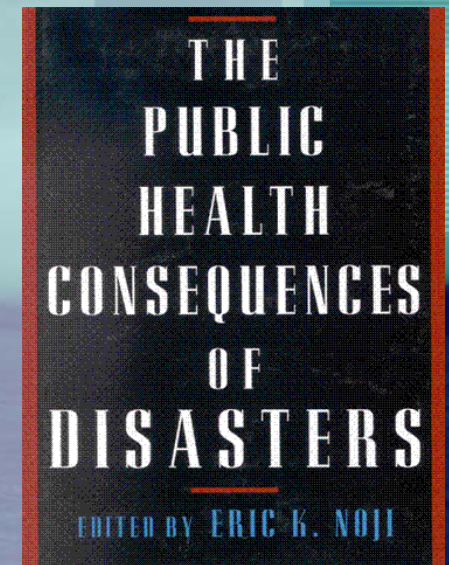
- Apakah faktor-faktor risiko bencana? Mengapa timbul korban? Bisakah jatuhnya korban dicegah?
- Apakah infrastruktur dan langkah-langkah yang harus disiapkan agar bencana tidak terjadi atau tidak menimbulkan korban dan kerusakan?

Jika bencana benar-benar terjadi...

- **Menentukan prioritas**
- **Mencermati trend dan menilai kembali prioritas**
- **Mendeteksi dan merespons kejadian luar biasa**
- **Mengevaluasi efektivitas program**
- **Menjamin pengeralahan sumberdaya**
- **Menilai kualitas pelayanan kesehatan**

BENCANA

Bencana diakibatkan oleh kekacauan ekologi hubungan antara manusia dengan lingkungan mereka, merupakan kejadian serius dan mendadak dalam skala yang terlalu besar bagi masyarakat, sehingga membutuhkan upaya yang luar-biasa untuk mengatasinya, sering membutuhkan bantuan internasional



Source: EK Noji, The Public Health Consequences of Disaster

MENANGGULANGI BENCANA

Analisis dan Perencanaan



*Peraturan dan perundangan
meminimalkan kemungkinan bencana*



Kesiapan (sistem kewasadaan dini, persiapan logistik)



Respons (evakuasi, penampungan, supply)



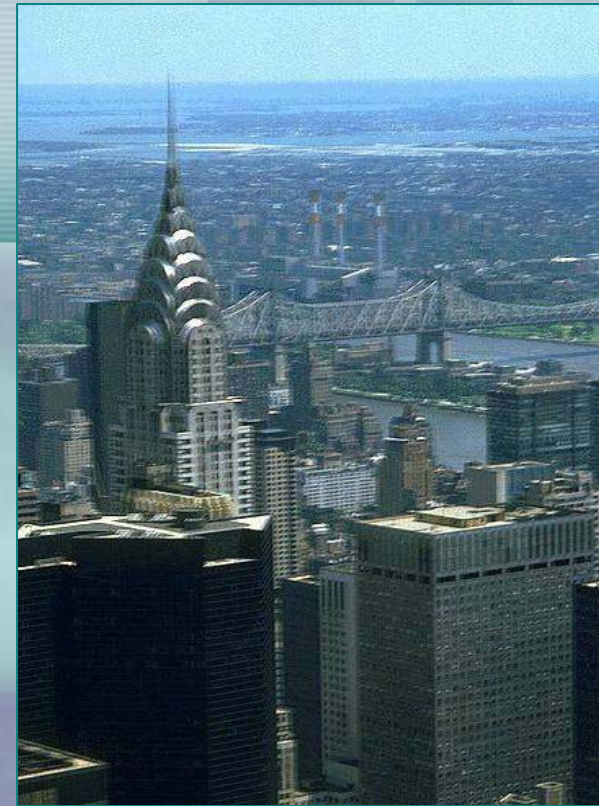
Pemulihan (kembali ke "normal")

Mengapa risiko bencana meningkat?

- ❖ Penduduk semakin padat
- ❖ Pemukiman di wilayah rawan
- ❖ Teknologi berpotensi mendatangkan bencana karena mengakibatkan kehancuran massal
- ❖ Konflik global: bom, rudal, senjata pemusnah massal
- ❖ Di negara maju, penduduk usia lanjut bertambah
- ❖ Emerging infectious diseases (SARS, Flu Burung?)
- ❖ Penerbangan internasional yang cepat

- Mobilitas global
- Populasi padat
- Kewaspadaan global lemah

...mudah terjadi banyak korban



Mitos dan Kenyataan

1) *Mitos*: dibutuhkan sukarelawan tenaga kesehatan dengan spesialisasi apapun

Kenyataan :

- Penduduk setempat hampir selalu melakukan penyelamatan segera.
- Hanya keterampilan yang tidak ada di tempat bencana yang diperlukan
- Hanya sedikit korban yang selamat berkat pertolongan dari luar daerah

2) *Mitos*: Setiap jenis bantuan dibutuhkan, sekarang juga!

Kenyataan:

- Respons tergesa-gesa tanpa evaluasi cermat tetapi cepat, hanya menimbulkan kekacauan
- Barang yang tidak diminta hanya akan membebani dan mengalihkan sumberdaya yang perlu, seringkali dibuang, tidak disimpan
- Tidak diinginkan, jarang dibutuhkan
 - pakaian bekas, rumah sakit lapangan, obat-obat canggih

3) *Mitos*: Wabah dan kejadian luar biasa tidak bisa dihindari dalam setiap bencana

Kenyataan:

- **Wabah penyakit mungkin tidak terjadi setelah bencana**
- **Jenasah korban meninggal umumnya tidak akan mengakibatkan wabah penyakit aneh**
- **Pemulihan pelayanan kesehatan masyarakat dapat menjamin keselamatan penduduk, meliputi:**
 - **Imunisasi, sanitasi, pembuangan limbah, air bersih, dan makanan sehat**

4) *Mitos:* Bencana mengakibatkan perilaku terburuk pada mereka yang mengalaminya

Kenyataan:

- Pada umumnya orang merespons secara spontan dan murah hati, walaupun ada pula segelintir perilaku antisosial**

**“40-60% penurunan
kejadian pembunuhan di
New York City setelah
11/9) - “paling rendah
sejak 1958”
- USA Today 03/25/2002**

Orang Kenya antri sampai 3 km di terik matahari bulan Agustus setelah pengeboman Kedutaan AS untuk donor darah

5) **Mitos:** Masyarakat terlalu syok dan bingung

Kenyataan:

- **Banyak yang menemukan kekuatan**
- **Pengorbanan lintas budaya, etnik dan agama umum ditemukan sebagai respons bencana alam**
- **Ribuan sukarelawan menyelamatkan orang yang tidak dikenal setelah gempa bumi di Mexico City, California, dan Turki.**
- **Sebagian besar penyelamatan, pertolongan pertama, transportasi dilakukan korban lain atau mereka yang selamat**

Epidemiologi untuk mengetahui:

- ❑ Masalah prioritas di antara masyarakat yang menjadi korban
- ❑ Penyebaran penyakit-penyakit
- ❑ Faktor-faktor risiko khusus
- ❑ Prioritas intervensi kesehatan
- ❑ Luas kerusakan dan kapasitas sarana/prasarana lokal
- ❑ Memantau trend kesehatan
- ❑ Menilai dampak program pertolongan

Respons Bencana

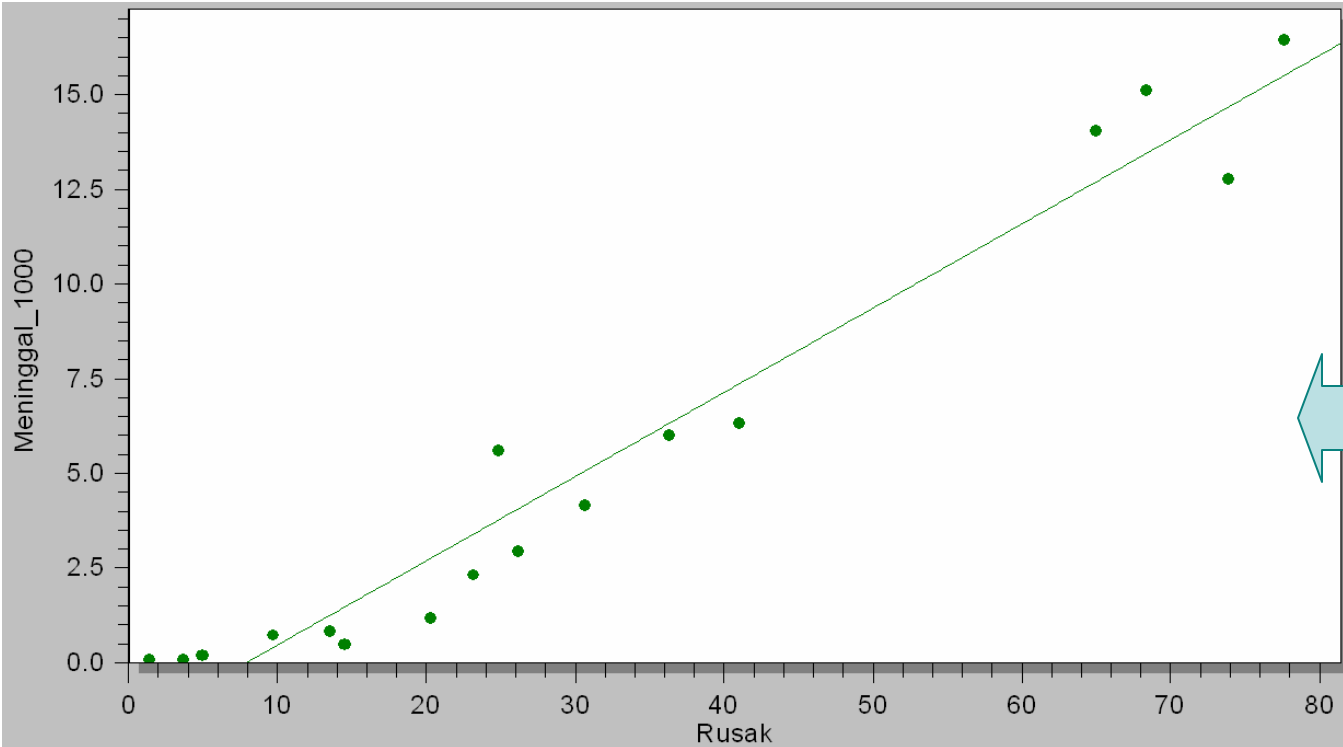
Tantangan

menghadapi situasi khusus akibat

- Kerusakan fisik
- Ketakutan dan kecemasan masyarakat
- Kekacauan sosial
- Tidak ada infrastruktur pengumpulan data
- Waktu mendesak
- Perpindahan penduduk
- Kurangnya dukungan sarana dan keahlian di tempat bencana

Tahap Rekonstruksi Pasca-bencana:

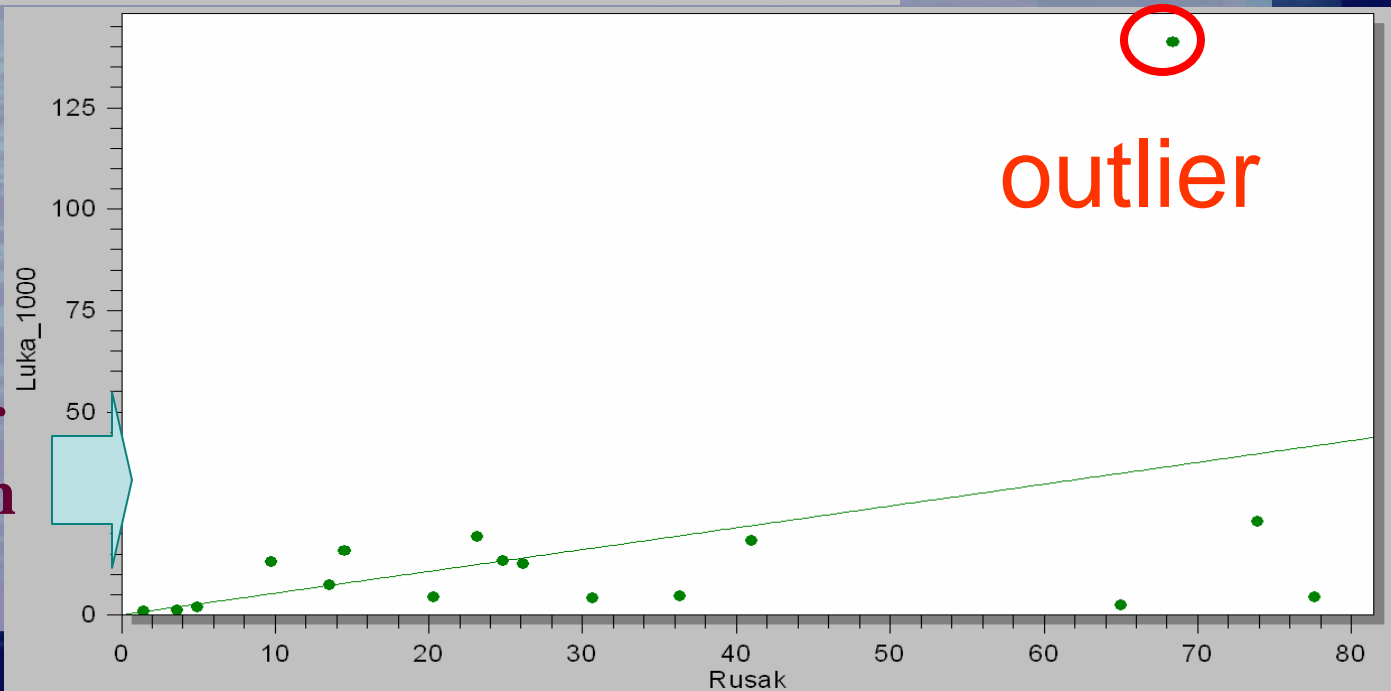
- Kajian follow-up setelah bencana
- Apakah risiko kematian dan cedera?
- Strategi perencanaan untuk mereduksi dampak terkait dengan morbiditas dan mortalitas
- Bagaimana akses (proporsi yang bisa memanfaatkan pelayanan), cakupan (proporsi yang memanfaatkan), mutu pelayanan dan ketersediaan pelayanan yang dibutuhkan?



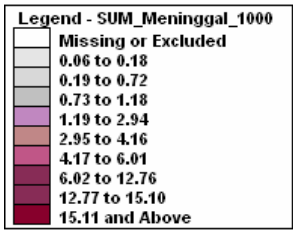
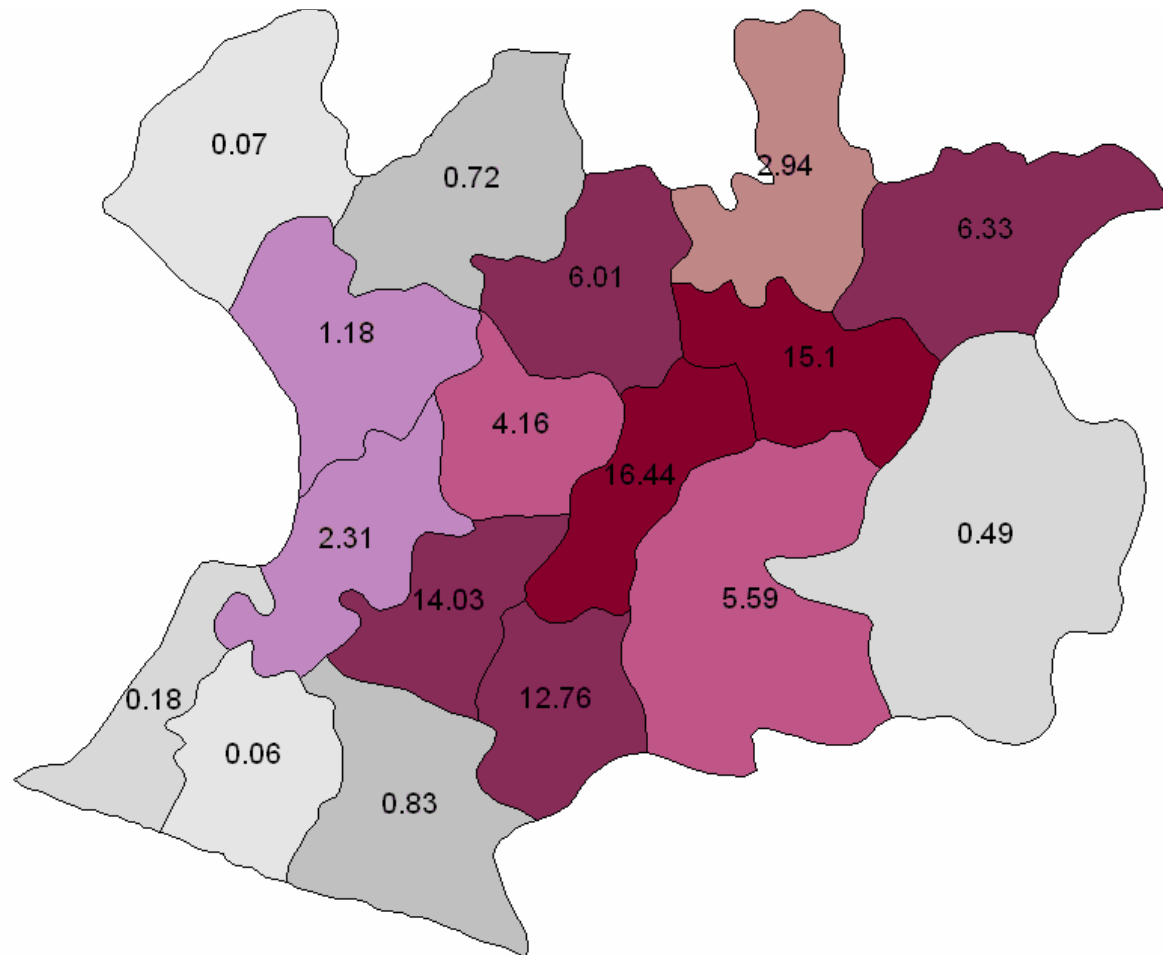
**Regresi kematian
(per 1000
penduduk)
dengan prediktor
kerusakan rumah
(%)**

Di Bantul..

**Regresi cedera
(per 1000
penduduk)
dengan prediktor
kerusakan rumah
(%)**



outlier



Distribusi geografik jumlah korban meninggal (per 1000) di Bantul

Fase Rekonstruksi Setelah Bencana

- Mengembangkan intervensi spesifik
- Evaluasi efektivitas intervensi
- Melakukan kajian deskriptif dan analitik
- Merencanakan respons medik dan kesehatan masyarakat bila bencana terjadi di masa mendatang
- Melakukan follow-up jangka panjang kegiatan rehabilitasi/rekonstruksi

Source: EK Noji, [The Public Health Consequences of Disaster](#)

Dibutuhkan:

- **Protokol baku untuk pengumpulan data segera setelah bencana**
- **Terminologi, metode dan prosedur baku**
- **Riset operasional untuk inventori obat dan alat kesehatan dan menentukan: 1) kebutuhan nyata, 2) kapasitas lokal, 3) kebutuhan yang dipenuhi oleh komunitas nasional dan internasional**
- **Evaluasi untuk menentukan efisiensi dan efektivitas upaya penyelamatan dan mengatasi kedaruratan**

Source: EK Noji, [The Public Health Consequences of Disaster](#)

Dibutuhkan:

- **Database untuk riset berdasarkan sistem informasi bencana yang telah terjadi pada masa lalu**
- **Identifikasi cara mencegah injury**
- **Meningkatkan pelayanan medik sebelum terlambat dan sesuai kebutuhan setelah bencana terjadi (search & rescue, emergency medical services, importing skilled providers, evacuating the injured)**
- **Segera memulihkan sistem kesehatan lokal dengan kapasitas penuh**

Dibutuhkan

- **Definisi yang seragam tentang disaster-related injury dan skema klasifikasi**
- **Investigasi transmisi penyakit dan kondisi mental setelah bencana**
- **Kajian atas masalah terkait dengan massive influx tenaga dan pasokan bantuan ke tempat bencana**
- **Analisis cost-benefit dan cost-effectiveness**

Indikator Kuantitatif dan Kualitatif Program Kedaruratan Bencana

- **Kebijakan Kesehatan:** *komitmen politik, kerjasama lintas sektor, partisipasi masyarakat*
- **Profil Demografik:** *struktur penduduk yang mengungsi (displaced population)*
- **Status Kesehatan:** *tingkat kematian, penyakit dan kurang gizi*
- **Input Program:** *staf, fasilitas dan peralatan, supplies, energi, transportasi*
- **Proses Program:** *akses, cakupan dan mutu pelayanan sosial, lingkungan dan kesehatan*

Contoh Indikator Baku

INDICATOR	NUMERATOR	DENOMINATOR
Case fatality rate (CFR)	Total deaths from specific disease in a time period	Total cases diagnosed with disease in same period
Cause-specific mortality	Total deaths from specific disease in a time period	Total population existing at midpoint of time period
Child mortality rate (CMR)	Total deaths in children aged 1-4 years old	Total children age 1-4 years alive at midpoint of time
Crude mortality rate (CMR)	Total deaths (for all ages) in time period	Total population at midpoint of time
Infant mortality rate (IMR)	Total deaths in children less than 1 year old	Total live births in one year
Maternal mortality rate (MMR)	Total deaths due to pregnancy and childbirth	Total women age 15-49 years
Maternal mortality ratio	Total deaths due to pregnancy and child birth	Total live births in 1 year
Proportional morbidity	Total cases due to specific disease	Total cases during that period
Under five mortality rate	Total deaths in children under five years	Total children under 5 years
Incidence rate	Total new cases with illness in a time period	Total population at risk in same period
Prevalence rate	Total existing cases with illness over a time period	Total population existing at midpoint of time period
Crude birth rate (CBR)	Total number of births in a time period	Average total population during same period
Global malnutrition rate	Total children under 5 years whose WFH is less than -2 SD (Standard Deviations)	Total children under 5 years
Severe malnutrition rate	Total children under 5 years whose WFH is less than -3 SD (Standard Deviations)	Total children under 5 years
Total fertility rate (TFR)	Total number of live births in one year	Total women aged 15-44 years at midpoint of time

Rapid Assessment

- **Seberapa parah kedaruratan yang dihadapi?**
- **Kebutuhan kesehatan penduduk yang mengalami bencana**
- **Prioritas dan tujuan tindakan yang dibutuhkan**
- **Kapasitas lokal untuk merespons bencana**
- **Bantuan dari luar untuk tindakan prioritas**
- **Merancang sistem informasi yang sesuai**

Background Information:

- ◆ Origin, extent and progression of disaster
- ◆ Political, social, and economic effects of disaster on displaced population
- ◆ Pre-disaster demographic and health data

Demographic Profile:

- ◆ Affected population: total and new arrivals, age/sex distribution
- ◆ Determine the average household size
- ◆ Identify vulnerable groups

Community Health Information:

- ◆ Common health problems at place of origin
- ◆ Previous sources of health care
- ◆ Determine important health beliefs and traditions
- ◆ Determine existing social structure
- ◆ Strength and coverage of public health programs at place of origin
- ◆ Access to services

Health Status:

- ◆ Calculate the crude mortality rates
- ◆ Determine the incidence rates of diseases of public health importance
- ◆ Determine pre-disaster nutritional status and eating habits
- ◆ Prevalence of protein-energy malnutrition in the < 5 years population
- ◆ Prevalence of micro-nutrient deficiencies in the <5 years population
- ◆ Assess the need for reproductive health care

Environmental Conditions:

- ◆ Determine climatic conditions
- ◆ Identify geographical features of the site location
- ◆ Assess existing shelters
- ◆ Assess where and how human waste is disposed
- ◆ Identify where people are getting water
- ◆ Determine the local disease patterns
- ◆ Identify local disease vectors
- ◆ Assess security conditions

Needs and Available Resources:

- ◆ Identify and assess local, regional, and national food stocks
- ◆ Assess strength and coverage of local PHC services, including referral of patients
- ◆ Assess availability and capacity of local health staff
- ◆ Assess the availability of medical supplies
- ◆ Assess capacity of existing surveillance system
- ◆ Assess local availability of materials for shelter and fuel
- ◆ Assess current relief response by local and/or international groups
- ◆ Assess the relief supplies and distribution systems
- ◆ Assess the logistics of transport and storage
- ◆ Assess existing communication system
- ◆ Assess coping mechanisms and capacity of affected population

Future Prospects :

- ◆ How might the situation evolve: more disaster, influxes, dependency or exit strategy?

Sumner Data Rapid Assessment

SOURCE	* INFORMATION TO BE COLLECTED	METHOD OF DATA COLLECTION
Affected population	Background information, pre-/post-disaster community health information, environmental conditions, needs and available resources, future prospects	Surveys, observation, mapping, interviews, focus groups
Host government authorities	Background information, demographic profile of local and displaced population, needs and available resources, future prospects	Mapping, interviews, review census and survey reports (e.g., Demographic Health Survey)
Health authorities (local/central MOH)	Health status, environmental conditions, health policies, needs and available resources	Interviews, review registers, surveys, reports
Health facilities (MOH, private, NGO)	Health status of local (and perhaps displaced) populations, needs and available resources	Observation, interviews, review registers, surveys, reports
Humanitarian agencies (international & local), multi-lateral agencies (e.g., UN), media, internet web sites	Background information, pre-/post-disaster demographic and health status data, needs and available resources, future prospects	Interviews, review registers, surveys (e.g., Demographic Health Survey), situation reports

Survei Bencana

PLANNING	ORGANISING
<ol style="list-style-type: none">1. Plan the Survey<ul style="list-style-type: none">• Identify the health problem and its importance• Determine what additional information is required to solve the identified health problem• Establish why a survey is the best way of obtaining the necessary information2. Survey Design<ul style="list-style-type: none">• Define the survey objectives, e.g., to determine the prevalence of malnutrition among children less than 5 years• List the main questions the survey should answer to achieve the survey objectives• Outline the methods and instruments for gathering the information• Estimate the time and resources needed for the survey (training, collecting and analysing data, etc.)3. Plan How Results Will Be Analysed and Reported<ul style="list-style-type: none">• Work out the main end-results expected from the analyses in form of "dummy tables"• Draw an outline of the survey report: section headings, tables, graphs, etc.4. Sampling<ul style="list-style-type: none">• Define the population to be surveyed and their location based on the survey objectives, e.g., for malnutrition, the under-five population may be adequate• Decide on sampling method and calculate the sample size• Outline the sampling plan5. Design the Survey Questionnaire<ul style="list-style-type: none">• Select indicators and appropriate questions• Test the questionnaire, methods, equipment and analysis procedure	<ol style="list-style-type: none">6. Prepare the Community<ul style="list-style-type: none">• Inform the community leaders about the purpose and method of the survey• Get their agreement and co-operation7. Train the Supervisors and Interviewers<ul style="list-style-type: none">• To sample respondents as needed• To keep their respondents interested in the interview• To ask each question in a standard way• To correctly take measurements and record data on the questionnaires8. Conduct the Survey<ul style="list-style-type: none">• Involve community leaders• Arrange for supervision and regular discussion• Review completed questionnaires with the interviewers9. Analyse and Interpret the Data<ul style="list-style-type: none">• Manually tabulate the data (tables, frequencies)• Calculate averages, percentages, rates, etc.• Graph and tabulate analysis results• Interpret results in light of other information10. Survey Report<ul style="list-style-type: none">• Write a survey report and present findings to and receive feedback from the community, MOH, other NGOs, and survey data collectors• Incorporate data and feedback into health information system• Develop recommendations and action plan from survey results and feedback (no survey without action)11. Evaluate the Survey<ul style="list-style-type: none">• If survey objectives were achieved, key lessons learned in the process• Program changes resulting from the survey• Effectiveness of revised program in addressing the health problem and needs identified under step 1

Tujuan Survei

- Mengukur kejadian dan prevalensi penyakit atau kondisi kesehatan
- Memperkirakan kejadian yang telah lewat
- Memperkirakan cakupan pelayanan
- Mengidentifikasi populasi berisiko
- Memahami kepercayaan, perilaku masyarakat setempat terkait dengan kesehatan
- Menguji hipotesis keterkaitan faktor risiko dengan kejadian kesehatan

Laporan Survei

Outline for a Full Survey Report

Introduction

Purpose of survey

Survey area

Dates of survey

Methodology

Indicators

Sampling frame

Questionnaire used

Survey Results

Highlights

Graphs with charts and tables

Conclusions and Recommendations

Significant findings

Problem areas

Potential actions

Further investigations

Surveillance dalam Kedaruratan

	Emergency Phase	Post-Emergency Phase
Duration Method of Data Collection	1-4 months Screening, Initial assessment, Simple surveys, Observation by walking around	From the first month(s) onward Regular population-based surveys, Ongoing Health information system
Main Priority	Reduce mortality rates	Detect disease outbreaks, Design and monitor programs, Monitor quality of programs
Type of Data Collection	Mostly active collection, Largely qualitative	Both passive and active collection, More quantitative
Defining Population Size	Sample survey methods	Census and supplemental surveys
Case Definition	Simple clinical signs and symptoms, A few common conditions	May include lab confirmation, More in number
Outbreak Investigation	Informal, Watch for measles, cholera	Formal with process in place, Reportable disease list
Surveillance and Use of Data	Simple, Data needed for immediate actions	Comprehensive, Used to assess quality, For longer term health needs, Addresses less urgent issues, (Emphasises public health approach)

Reportable Diseases	Diseases of Public Health Importance
<ul style="list-style-type: none"> • Measles • Cholera • Meningitis • Hepatitis • Tuberculosis • Yellow fever • Haemorrhagic fever 	<ul style="list-style-type: none"> • Rabies • Tetanus • Sexually transmitted infections (gonorrhoea, syphilis, chlamydia, genital ulcer disease, chancroid) • HIV/AIDS

SURVEYS	SURVEILLANCE
<p>Intermittent, focused assessments that collect population-based health data (active).</p>	<p>Ongoing, systematic collection, analysis, and interpretation of facility-based data (mainly passive).</p>
<p>Collect information on demography, morbidity, mortality, nutritional status (acute malnutrition) and program indicators (e.g., EPI, ANC, SFP, use of health services).</p>	<p>Collect information on demography, morbidity, mortality, births, nutritional (micro-nutrient deficiencies), health services and environmental health indicators.</p>
<p>May be limited to concerned agency/facility.</p>	<p>Should involve all health agencies and facilities.</p>
<p>With appropriate sampling, allows for filling of information gaps in community-level data.</p>	<p>Captures those who attend facility-based services, therefore not representative of all needy groups.</p>
<p>Requires more time and resources to organise, but is a one-time cost only.</p>	<p>Less costly since integrated within routine services and the existing system.</p>

Kriteria Data yang Dikumpulkan

Criteria	Description
Simple	Data is easily collected and recorded in a logical, transparent manner.
Representative	Indicators used are in line with the defined problem, e.g., use Weight-For-Height, not Weight-For-Age to assess for acute malnutrition.
Relevant	Limited to relevant public health information that can and will be acted upon, e.g., prevalence of intestinal worms is not a priority indicator of health status during the acute emergency phase.
Timely	In detecting any outbreak (may depend on the frequency of reporting data)
Reliable	Information is gathered in a standard manner (case definition, tools, procedure) and can be reproduced.
Standardised	Indicators should mean the same to data collectors at a particular level, e.g., the case definition for malaria is the same for all CHWs.
Continuous	Performs repeated measurement of the same indicator to detect trends.
Acceptable	To both the affected population and to the authorities.
Flexible	Can adapt to new health problems or sudden program changes.

Daftar Periksa Investigasi Wabah

KEY STEP	DESCRIPTION
1. Notify the host health authorities.	<ul style="list-style-type: none"> • Provide essential information on the affected sites, the time period, the frequency and profile of cases, the clinical presentation and disease outcome, a possible diagnosis and suspected source of infection.
2. Confirm the outbreak.	<ul style="list-style-type: none"> • Define a "case" and count the number of reported cases (the numerator): Is the disease known? Are the causes partially understood? • Define the denominator: What is the population at risk of developing the disease? • Calculate the attack rates. • Review previous levels of disease and local knowledge of disease outbreaks.
3. Describe the outbreak in terms of <i>time</i> , <i>place</i> and <i>person</i> .	<ul style="list-style-type: none"> • Graph reported dates of disease onset for all cases to establish the <i>timing</i> (incubation period) and the source of disease (single or multiple sources). • Map the residence of all reported cases to identify the most affected areas and the direction of the disease spread (see spot map in the DATA ANALYSIS section). • Calculate the age- and sex- specific rates to identify <i>who</i> is most vulnerable. • Collect population data for the communities at risk (more denominators).

Daftar Periksa Investigasi Wabah

4. Analyse <i>what</i> caused the outbreak.	<ul style="list-style-type: none"> • Look for links or interaction between relevant factors (e.g. floods increasing the <i>Aedes</i> mosquito population and reducing access to health care resulting in an outbreak of dengue fever).
5. If necessary, conduct additional studies.	<ul style="list-style-type: none"> • Interview cases with disease and non-cases to identify possible <i>sources</i> and method of disease <i>transmission</i> (common source or person-to-person). • Determine the proportion of cases and non-cases that had possible <i>exposure</i> to infection. • Identify important differences between the cases and non-cases to define the individuals/groups at increased risk of contracting the disease. • Collect specimens from cases and non-cases for laboratory investigation.
6. Assess the environment, if necessary, based on the analysis of the outbreak.	<ul style="list-style-type: none"> • Investigate for vectors, faecal contamination, toxic chemicals.
7. Initiate prevention and control strategies.	<ul style="list-style-type: none"> • Source reduction (treat cases and carriers, isolate cases, control animal reservoirs). • Prevent transmission (health education, personal and environmental hygiene, vector control, restrict movements). • Protect vulnerable people (immunisation, chemo-prophylactics, personal protection, nutrition). • Continue surveillance: maintain routine reporting, follow-up suspects, and set up special surveillance for new cases.
8. Prepare a report on the outbreak that covers the following points:	<ul style="list-style-type: none"> • The causative agent and probable routes of transmission. • Description of the trend in the disease outbreak, the geographic distribution and the clinical presentation among cases. • The reason for the outbreak. • Disease control measures that were introduced. • Recommendations for prevention of future outbreaks.