Airport Health in the ASEAN Economic Community (AEC) Era

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ABSTRACT

In 2004, it is estimated that 95 million passengers were flying from, to and within Indonesia. This has been accompanied by the increase in risk of disease transmission, health and safety of the travelers and local people at destinations. This trend will be spurred by implementation of ASEAN Economic Community at the end of 2015. An aviation master plan including global standards, developed in partnership and development of top priorities including health, safety, capacity, and regulation, is an integral part in supporting a healthy airport health. This paper aims at assessing and describing key preventive measures to be applied in the development airport health programs.

The main health and safety problems were assessed, and found that ideal airport health programs should consist of measures focusing on three main targets i.e. passenger, airport, and community. Passenger’s health will cover assessment of fitness to fly and non-communicable diseases risks. In addition, infectious diseases control such as airport exit and entry screening, self-reporting, isolation, health monitoring, contract tracing, and hygiene measures should be considered on a case by case basis. At the airport level, the programs should include occupational and environmental health aspects such as hazard identification, risk assessment and control, as well as air quality monitoring. At this level, it is also imperative to provide health promotion, airport hygiene, and medical services. The last focus will target the community, such as performing health impact assessment at the vicinity area and preventing spread of diseases in the community by strengthening surveillance system in collaboration with the authorities.

Keywords: airport health programs, ASEAN Economic Community, Passenger’s Health
Why airport health...

• Air travel has expanded at an unprecedented rate and continues to do so
  • Passengers movement
  • Risk of disease transmission
  • Travelers and local community health

• Airport health is integral part to support this development
Air Transport, Passengers Carried

Indonesia (2010-2014)

- 2010: 59,384,362
- 2011: 70,912,258
- 2012: 79,405,800
- 2013: 88,594,513
- 2014: 94,504,086

World Bank Data (ICAO, Civil Aviation Statistics)
## BPS-Statistics Indonesia

<table>
<thead>
<tr>
<th>Year</th>
<th>Aircraft (Unit)</th>
<th>Passenger (Person)</th>
<th>Cargo (Ton)</th>
<th>Baggage (Ton)</th>
<th>Mail/Package (Ton)</th>
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(BPS, 2014)
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<th>Year</th>
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<th>Cargo (Ton)</th>
<th>Baggage (Ton)</th>
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<td>2013</td>
<td>800 193</td>
<td>77 568 403</td>
<td>469 149</td>
<td>613 197</td>
<td>9 039</td>
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</table>

(BPS, 2014)
Distribution of Passenger Departures for International by Airports of Origin, 2013

- Soekarno-Hatta: 48.54%
- Juanda: 6.81%
- Hasanuddin: 0.56%
- Sepinggan: 0.40%
- Ngurah Rai: 26.22%
- Others: 10.96%

(BPS, 2014)
Distribution of Passenger Departures for Domestic by Airports of Origin, 2013

- Soekarno-Hatta: 30.04%
- Juanda: 9.70%
- Hasanuddin: 4.72%
- Sepinggan: 4.45%
- Ngurah Rai: 5.77%
- Kualanamu: 4.48%
- Others: 40.85%

(BPS, 2014)
Indonesia’s aviation potential

According to IATA, by 2034:

• Indonesia is expected to be the sixth largest market for air travel

• Approximately 270 million passengers are expected to fly to, from and within Indonesia

→ Indonesia needs an aviation masterplan
  • global standards
  • developed in partnership by aviation stakeholders including the government
  • top priorities: health, safety, capacity, and regulation (including airport)
What the literature says...

PubMed Search
Medline database 1951 – August 2015
#1 Airport Health : 123 articles
#2 Air Travel AND Health : 9 articles
#1 OR #2 : 129 articles
(scanned on title and abstract)

Query Translation:

```plaintext
(($"airports"[MeSH Terms] OR "airports"[All Fields] OR "airport" [All Fields]) AND "health"[MeSH Terms]) OR ("air travel"[MeSH Terms] AND "health"[MeSH Terms])
```
# Studies related to Airport Health

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<td>1</td>
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<td>2</td>
<td>Occupational Health Aspects: Airline Pilot, ATC, Other Ground Personnel</td>
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</tr>
<tr>
<td>3</td>
<td>Airport Screening and Prevention of Infectious Disease Transmission</td>
<td>32</td>
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<tr>
<td>4</td>
<td>Environmental Health Aspects at Airport, including Smoking Policy</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Health Impact of Airport to Surrounding Area</td>
<td>18</td>
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<tr>
<td>6</td>
<td>Airport Hygiene, Health Promotion, and Medical Services</td>
<td>7</td>
</tr>
<tr>
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<td>Unrelated Studies</td>
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<td></td>
<td><strong>Total</strong></td>
<td><strong>129</strong></td>
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</table>
Airport Health Components

Community
- Health Impact at Airport Vicinity
- Spread of Diseases in Community

Airport
- Occupational Health
- Environmental Health
- Health Promotion
- Airport Hygiene
- Medical Services
- Passenger’s Health
- Infectious Disease Control

Passenger
Prevention of Infectious Disease Transmission

• Dengue
• Malaria
• Tuberculosis
• Ebola
• MERS-CoV
• Avian Influenza
• Swine Flu
• SARS
Dengue and Air Travel

Risk posed by each airport in importing passengers with travel-acquired dengue infections
• risk at each stopover airport
• risk posed by incoming travellers to each destination airport
• identifies high risk airports
• prioritize optimal locations (airports) for targeted dengue surveillance
  • monitoring travelers within an airport
  • monitoring travelers exiting an airport
Malaria and Air Travel

- Increased rates of imported cases
- Local outbreaks in non-endemic areas
- Spread of drug resistance
- Flights bring infected vectors → “airport malaria”
- Identifies high risk airports
- Prioritize optimal locations (airports) for targeted malaria surveillance
Tuberculosis

WHO recommends that those:

- seated in the same row, as well as
- seated in two rows ahead and two behind should be regarded as ‘close contacts’
- but only for flights of 8 hours or more

→ Health information and self-report
Ebola epidemics

• WHO: a public health emergency of international concern
• International flight restrictions to and from Guinea, Liberia, and Sierra Leone
• Reductions in passenger seats by 50 – 85% → impacts on economy
• Exit screening of travellers at airports in the three countries → most efficient measures
Exit and Entry Screening

• Health declarations
  • report on their health status, travel plans and contact with infected people

• Medical examination and laboratory testing

• Thermal screening
  • Infrared thermal image scanners (ITIS) are used to identify febrile travelers by measuring body surface temperature
Evidence-based decision-support tool for cities at risk of the importation of a pathogen causing infectious disease

- Global area(s) with community-based epidemic activity
  - Effective exit screening implemented?
    - Yes
      - Non-stop flights arriving directly from affected area?
        - Yes
          - Infectious agent with short incubation period?
            - Yes
              - Evaluate role of entry screening
            - No
              - Screening of travellers not suggested
        - No
          - Evaluate role of entry screening
    - No
      - Non-stop flights arriving directly from affected area?
        - Yes
          - Screen of travellers not suggested
        - No
          - Screen of travellers not suggested

- Heighten local infectious disease surveillance and mobilize resources for public-health control

Overview of experiences and applicability of infectious disease control measures on airplanes. ++ very positive, + positive, +/- neutral, – negative, — very negative. l.o.i. = lack of information For total, the total of the other columns was taken.

<table>
<thead>
<tr>
<th></th>
<th>Outcome</th>
<th>Resources</th>
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<td>1. Entry and exit screening</td>
<td>+/-</td>
<td>--</td>
<td>-</td>
<td>--</td>
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<tr>
<td>2. Providing information to travelers &amp; self-reports</td>
<td>+/-</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>-</td>
<td>4</td>
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<tr>
<td>3a. Quarantine</td>
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<td>--</td>
<td>-</td>
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<tr>
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<td>+</td>
<td>+</td>
<td>-</td>
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<td>3c. Health monitoring</td>
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<td>+</td>
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<td>-</td>
<td>+</td>
<td>3</td>
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<td>4. Contact tracing</td>
<td>+/-</td>
<td>--</td>
<td>-</td>
<td>++</td>
<td>+</td>
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<td>5. Hygiene measures</td>
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<td>--</td>
<td>+</td>
<td>++</td>
<td>+</td>
<td>3</td>
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<tr>
<td>6. Travel restrictions</td>
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<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>8. Vector control</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>++</td>
<td>3</td>
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<tr>
<td>9. Control of goods</td>
<td>l.o.i.</td>
<td>l.o.i.</td>
<td>l.o.i.</td>
<td>l.o.i.</td>
<td>l.o.i.</td>
<td></td>
</tr>
</tbody>
</table>

a For every +, a point was added, for every -, a point was subtracted.

Huizer et al. Usefulness and applicability of infectious disease control measures in air travel: A review. Travel Medicine and Infectious Disease (2015) 13, 19e30
Infectious disease control measures

• Provision of **information to travelers, isolation, health monitoring, hygiene measures and vector control** are reportedly effective and well applicable

• **Contact tracing** can be supportive but depends on disease characteristics

• **Exit and entry screening, quarantine and travel restrictions** are unlikely to be effective, and requires extensive resources or travel implications
Occupational Health Aspects

- Cockpit crew (pilot, co-pilot)
- Cabin crew
- Air traffic controller (ATC)
- Ground personnel
- Maintenance workers
- Ergonomics problems
- Manual handling problems
- Respiratory problems
Environmental Health Aspects

• Cigarette Smoking Policy

• Polluting Substances
  • Nitrogen oxides,
  • Carbon dioxide,
  • Carbon monoxide,
  • Volatile organic compounds (VOCs) including polycyclic aromatic hydrocarbons (PAHs),
  • Sulfur dioxide,
  • Fine and ultrafine particles (UFPs)

• Elementary particle size in airports is between 23 and 36 nm → respiratory problems

• Air quality monitoring
Health Impacts

• Airport operations, particularly jet take-offs and landing, are contributing to elevated levels of black carbon in the area surrounding airport

• Elevated exposure to black carbon is associated with:
  • increased rates of respiratory and cardiovascular disease including asthma, bronchitis, and increased risk for sudden death
  • irreversible decrease lung function in children
  • increased carcinogenic risk
Health Impacts

• Elevated levels of ultrafine particles (UFP) are associated with aircraft operations and jet takeoffs and are found in the area surrounding airport

• Elevated exposure to UFPs are associated with:
  • increased inflammation and blockage of blood vessels in mice models
  • greater lung inflammation with exposure to UFPs than exposure to larger particulates in rodent models

• Kerosene → major compound in jet fuel, has a specific odour especially before fuel combustion, which can be smelled >8 km from the airport
Health Impacts

• Elevated levels of polycyclic aromatic hydrocarbons (PAH) are found in the area surrounding airport

• Exposure to PAH has been associated with:
  • increased carcinogenic risk
  • disruption of the hormonal balance in adults
  • reproductive abnormalities with exposure during pregnancy
  • lower IQ scores in children
Health Impacts

• Levels of noise due to plane and jet take-offs from are above thresholds

• Excessive noise is associated with:
  • hearing loss.
  • higher levels of psychological distress
  • impaired reading comprehension and memory among children
  • Hypertension and increase heart rate
  • sleep disturbance
RANCH Projects, London

• Road Traffic and Aircraft Noise Exposure and Children’s Cognition and Health
• 719 children who were 9–10 years of age from 22 schools around London’s Heathrow airport
• Aircraft noise exposure at school was significantly associated with poorer recognition memory and conceptual recall memory
Health Impact Assessment Amsterdam Airport Schiphol

• 1993-2006
• Sleep disturbance and aircraft noise exposure
• Effect of aircraft and road traffic noise on the cognitive performance of primary school children
• Cardiovascular disorders related to aircraft noise
• Respiratory diseases in children around Amsterdam Airport Schiphol
Airport Health Preventive Programs

Community

- Health Impact Assessment (HIA) and Control
- Spread of Diseases in Community
- Hazard Identification
- Risk Assessment and Control
- OHS Programs
- Air Quality Monitoring
- Environmental Health Programs

Airport

- Entry and Exit Screening
- Information and Self-report
- Isolation
- Health Monitoring
- Contact Tracing
- Hygiene Measures
- Vector Control
- Health Promotion
- Airport Hygiene
- Medical Services

Passenger

- Occupational Health
- Environmental Health
- Surveillance System & PH Control
- Passenger’s Health
- Infectious Disease Control
- Fitness to fly
- Travel related NCDs
- Infectious Disease Control
KEMENTERIAN RISET, TEKNOLOGI DAN PENDIDIKAN TINGGI
UNIVERSITAS UDAYANA
FAKULTAS KEDOKTERAN
PROGRAM STUDI KESEHATAN MASYARAKAT

SERTIFIKAT
Diberikan Kepada:
dr. I Made Ady Wirawan, MPH, PhD

Sebagai:
INVITED SPEAKER

Dalam Seminar Nasional dan Simposium dengan Tema:
"Kesehatan Pariwisata: Tantangan di Era Masyarakat Ekonomi ASEAN"
Gedung Teater Widya Sabha, Fakultas Kedokteran Universitas Udayana, Bali
Denpasar, 11 - 12 September 2015

Dekan
Fakultas Kedokteran Universitas Udayana

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