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Urban Floods and Human Health Impacts

Singapore International Water Week 2022

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Introduction

Here the kind of effects of El Nino.

Climate change triggers similar types of effects.

Source: https://www.who.int/hac/crises/el-nino/who_el_nino_and_health_global_report_21jan2016.pdf?ua=1

Background

Goal

Lowering the post flood health burden

By (strategy)

- Co-management of water and health
- Make flood health burden equally quantifiable as damage to infrastructure
- Use that to: integrate intervention investments; quantify solution scenarios

However:

- Climate change and health impact study is still limited
- Climate health resilience in developing countries is still underdeveloped
- Limited information on climate related health impact on local level
- Policy response for climate and health resilience is not adequately integrated

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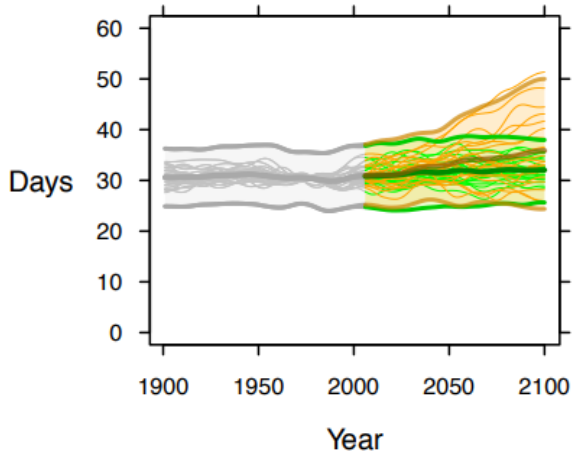
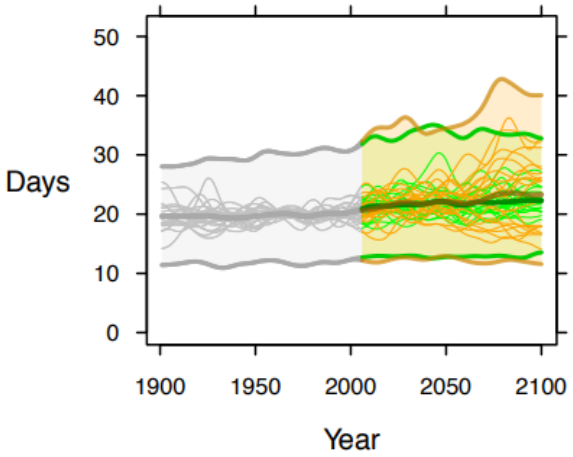
Current and Future Climate Hazards - Indonesia

- According to the Indonesian Disaster Data and Information Database (DIBI), the top four most dominant disasters in Indonesia are floods, windstorms, landslides, and droughts
- These events will be further exacerbated by the impacts of climate change in Indonesia, including temperature increases of 0.8– 2.0°C and predicted increases in duration of heatwaves, dry spells, and rainfall during the wet season – all by 2050.
- In addition, increased frequency and intensity of heavy rainfall events is predicted, as is sea level rise of 150–450 mm by 2056 and the complete disappearance of the Papua glaciers.

DAYS WITH EXTREME RAINFALL ('FLOOD RISK')

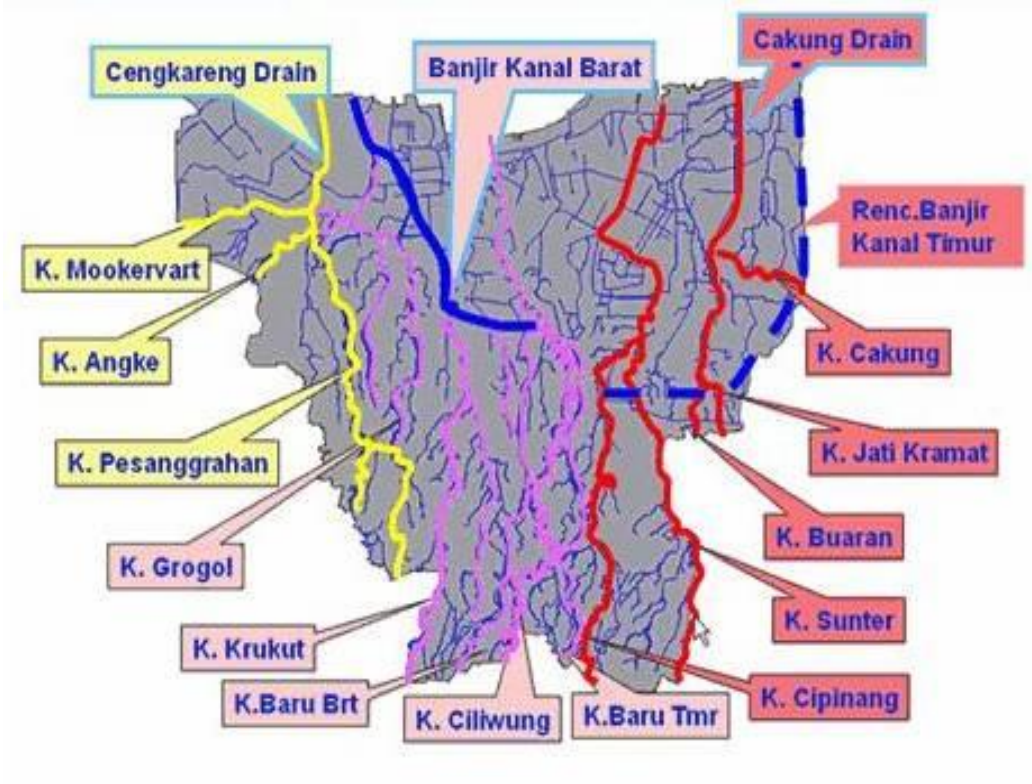


CONSECUTIVE DRY DAYS ('DROUGHT')



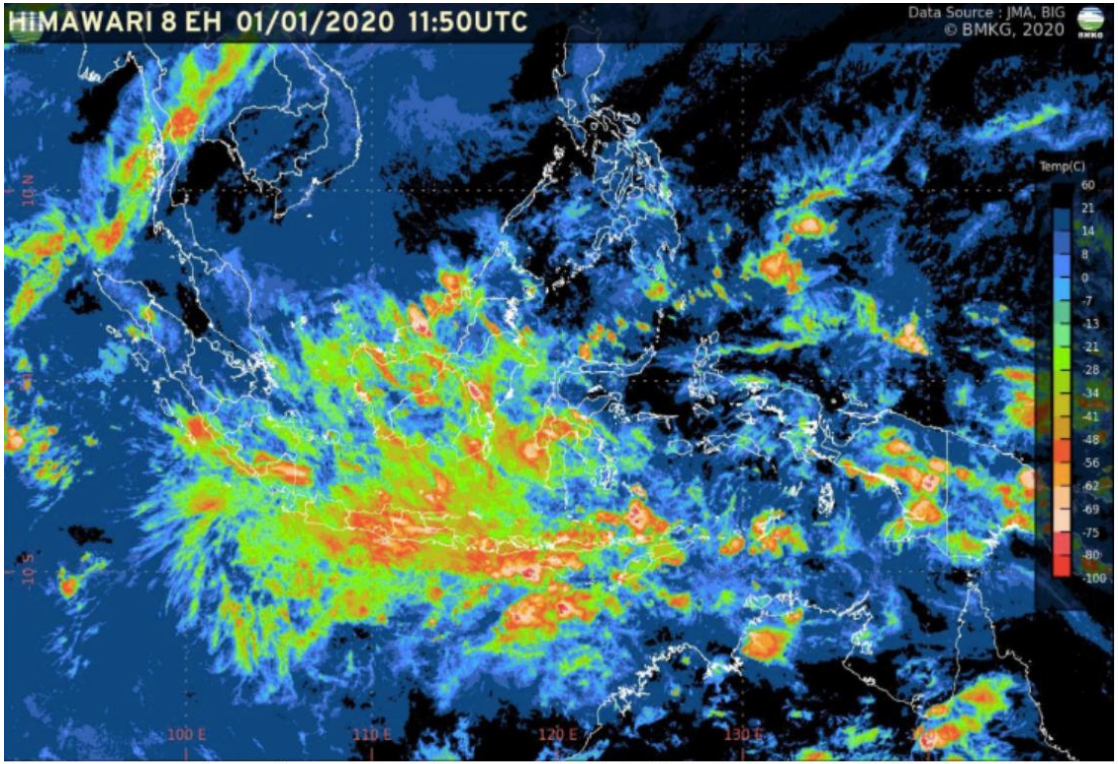
Source: WHO, UNFCC, CLIMATE AND HEALTH COUNTRY PROFILE – 2015 INDONESIA

Study Area: Jakarta



- Jakarta, located on the northwest coast of Java, is the economical, political and cultural capital of Indonesia.
- About 9 million people live in Jakarta, in an area of 660 km^2.
- As a city located in a low-lying area, with about a seven-metre elevation and with 13 rivers crossing it, Jakarta is incredibly susceptible to flooding.
- Increasing population pressure and soil subsidence (10 cm/year or more) of areas already under mean sea level.

Extreme Events: Jakarta's Flood 2020



Peta prakiraan cuaca ekstrim yang terjadi pada 1 -7 Januari 2020. Sumber : BMKG

- Rainfall with an intensity of 377 mm/day in Halim, East Jakarta became the highest new record rainfall in the history since 1866.
- The phenomenon of climate change is projected to cause higher and faster extreme weather intensity and frequency.

year	Highest precipitation (mm)
2020	377
2015	277
2013	100
2007	340
2002	168

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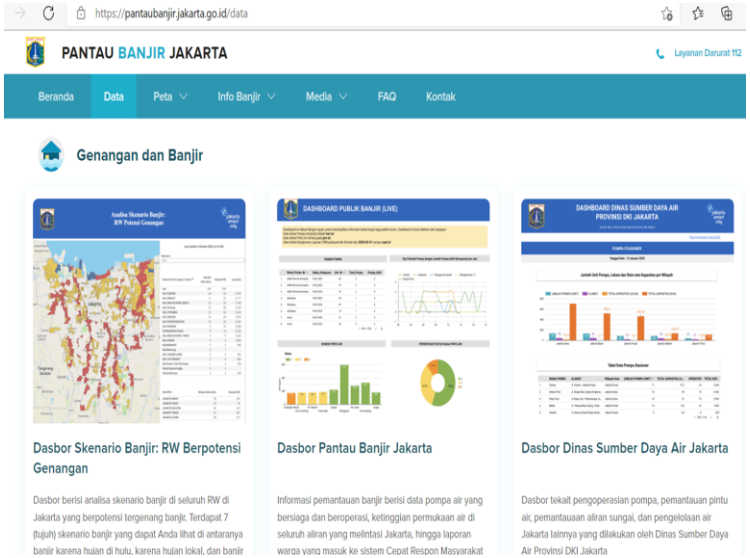
Research Question

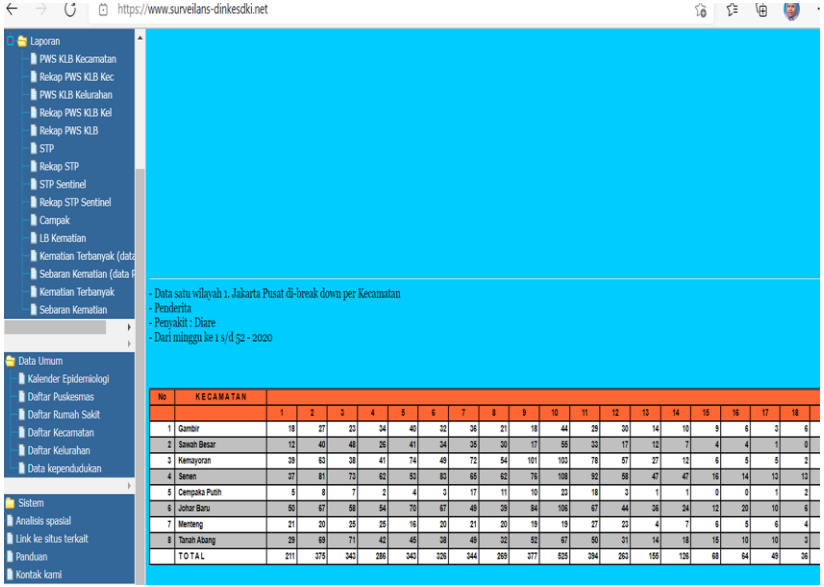
1. Can we use publicly available data on floods and health burden to find relations between disease burden and floods/rainfall?
2. Are health facilities adequately distributed according to the flood related health burden?
3. What the implementation of climate-health resilience as national policy response and local context?

Extreme events (flood) and major health impacts

Data Source: Flood events (nr), inundation (cm)
https://pantaubanjir.jakarta.go.id/

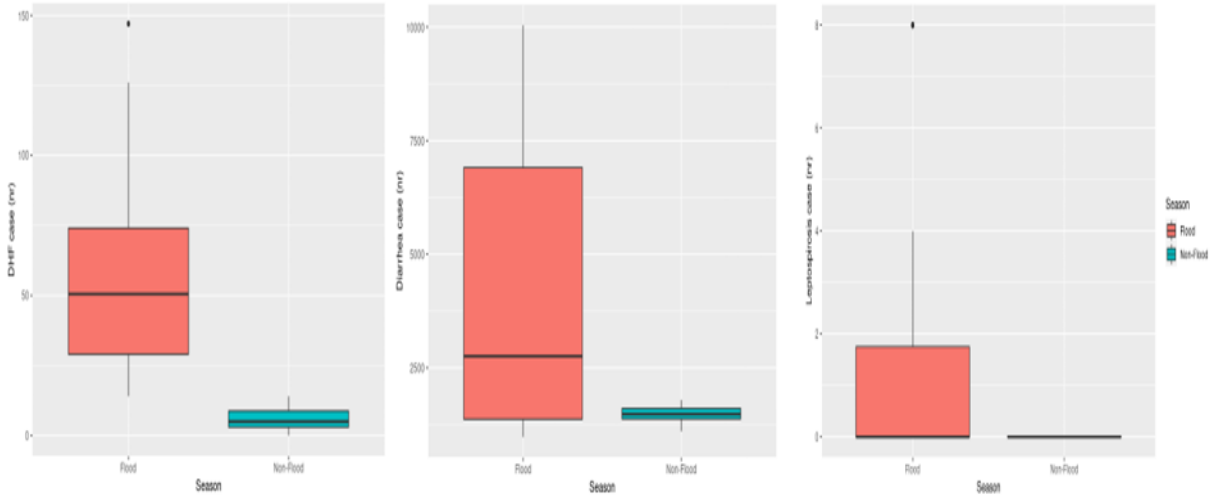


Data Source: Diarrhea, DHF, Leptospirosis
https://www.surveilans-dinkesdki.net



Both data was available on the same sub-district level and on a weekly basis. Both flood and health impact data are obtained from the local government dashboard, which can be accessed publicly.

Seasonal variation and health impacts



- The analysis of the data for Jakarta shows that there are significant differences between dengue haemorrhagic fever, diarrhea and leptospirosis during flood season and non-flood season (p-value 0.00-0.05).
- It is expected as exposure (especially in case of diarrhea and leptospirosis) can be increased during floods.

Table X. Mann Whitney U test result of seasonal variation and health impacts

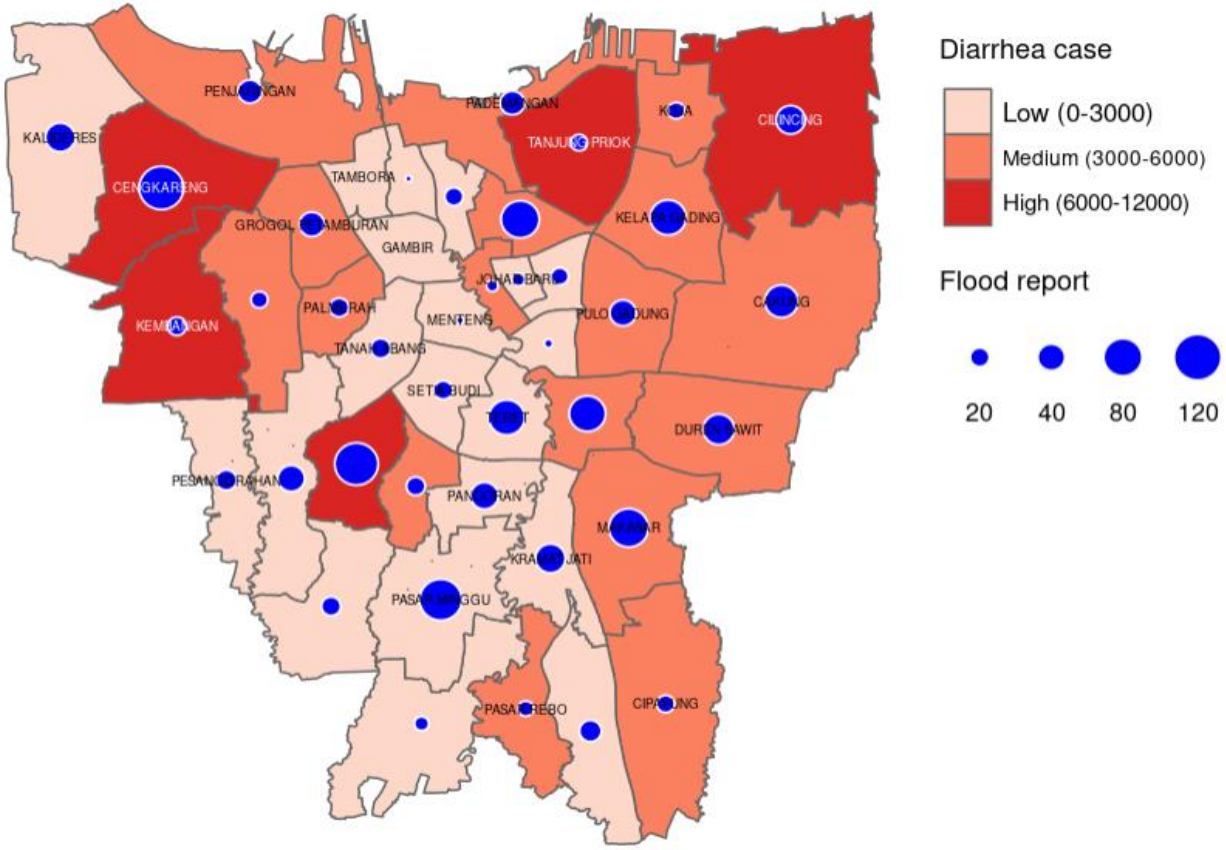
	P-value	95%CI	Sample Estimate Differences
Seasonal variation and DHF	0.00	33.00-57.00	46.00
Seasonal variation and diarrhea	0.05	-6.99 – 4649.99	1239.82
Seasonal variation and leptospirosis	0.00	0.00-0.0001	0.0001

Average inundation and health impacts

	P value	
	Flood report	Average inundation
Dengue hemorrhagic fever	0.807	0.321
Diarrhea	0.001	0.052
Leptospirosis	0.143	0.803

- However, the Spearman correlation test shows only diarrhea that correlates to average inundation (For dengue this is to be expected as the disease is seasonal, with floods being correlated to rainfall, but not necessarily causal to dengue)

Flood report and Health Impacts



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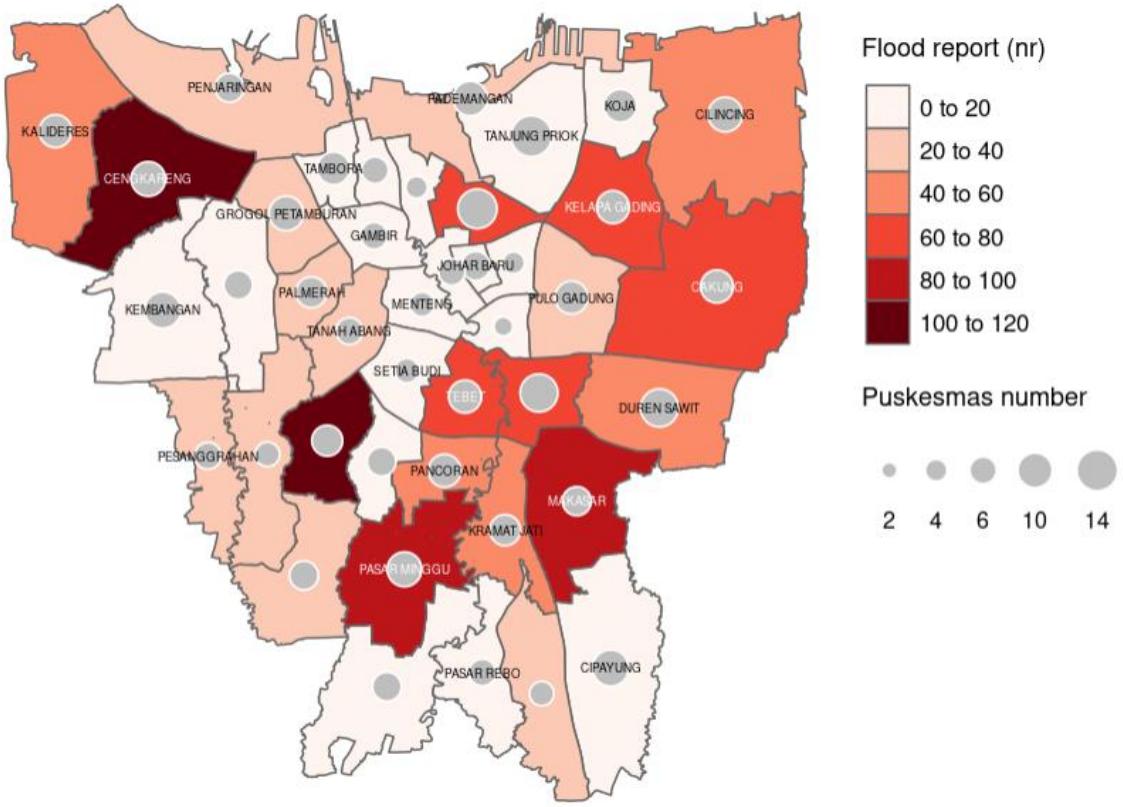
Flood Report – Health Facilities



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National Policy Response – Climate Health Resilience

GOVERNANCE AND POLICY	
Country has identified a national focal point for climate change in the Ministry of Health	✓
Country has a national health adaptation strategy approved by relevant government body	✓
The National Communication submitted to UNFCCC includes health implications of climate change mitigation policies	✗
HEALTH ADAPTATION IMPLEMENTATION	
Country is currently implementing projects or programmes on health adaptation to climate change	✓
Country has implemented actions to build institutional and technical capacities to work on climate change and health	✓
Country has conducted a national assessment of climate change impacts, vulnerability and adaptation for health	✓
Country has climate information included in Integrated Disease Surveillance and Response (IDSR) system, including development of early warning and response systems for climate-sensitive health risks	✓
Country has implemented activities to increase climate resilience of health infrastructure	✗
FINANCING AND COSTING MECHANISMS	
Estimated costs to implement health resilience to climate change included in planned allocations from domestic funds in the last financial biennium	✓
Estimated costs to implement health resilience to climate change included in planned allocations from international funds in the last financial biennium	✗
HEALTH BENEFITS FROM CLIMATE CHANGE MITIGATION	
The national strategy for climate change mitigation includes consideration of the health implications (health risks or co-benefits) of climate change mitigation actions	✗
Country has conducted valuation of co-benefits of health implications of climate mitigation policies	✗

Source: WHO, CLIMATE AND HEALTH COUNTRY PROFILE – 2015 INDONESIA

Recommendation for response in local context:

Before Flood event

During Flood event

After Flood event

Flood-health emergency risk management plan

1. Prevention and preparedness in flood prone area
2. Vulnerability and capacity assessment
3. Planning for governance and coordination measures

Rapid Health Assessment (RHA) on WASH

- Water supply
- Water storage
- Water quality
- Toilet
- Waste handling and disposal

Disease/outbreak surveillance

- Data and analysis
- Contingency plan
- Monitoring and evaluation

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Conclusion remarks

- This study shows that with use of existing public data some correlation between floods and health impacts could be established.
- Flood management plans which address the health impact with measures of social, governance, and infrastructure will not only improve post-flood aid efforts, but also strengthen the prevention of impact.
- The integration between flood-health risk management into climate health resilience policy in national context is needed

Thanks

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