OVERVIEW OF INFLUENZA (FLU) IN OLDER ADULTS

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Day1: 26 Dec. 2024

Time: 8:00-11:00

FLU: DO WE NEED TO APPROACH OLDER ADULTS DIFFERENTLY?

Senior citizens=>65years

- Now and future of aging
- Elderly characteristics
- Flu definition
- Flu outbreak history - epidemiology
- Flu burden: aging
- Flu vaccine coverage

ELDERLY FUTURE

- The world is ageing rapidly. According to United Nations population projections:
- Between 1974 and 2024 (50yrs), the worldwide share of people aged 65 almost doubled – increasing from **5.5%** per cent to **10.3%**.
- **Between 2024 and 2074 (40yrs),** this number will double again, increasing to 20.7%.
- During the same time, the number of persons aged **80 and above** is projected to more than triple.
- Developed countries have the highest share of older persons, **developing countries** are often witnessing a rapid rate of population ageing, leaving many ill prepared for the new realities.

Letter to the Editor

The Growth of Aging Population in Iran: An Achievement or a Challenge?

Bakhtiar Piroozi, Amjad Mohamadi-Bolbanabad & Azad Shokri

Pages 711-714 | Published online: 10 Apr 2024

Cite this article https://doi.org/10.1080/01634372.2024.2340725 Check for updates

https://www.tandfonline.com/doi/full/۱۰/۱۰۸۰/۰۱۶۳۴۳۷۲/۲۰۲۴/۲۳۴۰۷۲۵

An Achievement or a Challenge?

- **Mean age: 32 yrs**
- **Elderly rate:**
  - ❖**2016: 9/5%** **2024: 11%**
  - ❖**2030: 15%**
  - ❖**2050: 30%** **doubling time 20y**

WORLD POPULATION AGEING 2019 HIGHLIGHTS:

BUILD A LARGER, STRONGER AGING SERVICES WORKFORCE

The world is ageing rapidly & need infrastructure

- Policy implications for achieving the **Sustainable Development Goals**
  - **A.** Population ageing seen from a **conventional perspective/health**: the old-age dependency ratio
  - **B.** Measuring population ageing considering remaining years to live: The prospective **old-age dependency** ratio
  - **C.** Measuring population ageing from an **economic perspective:** The economic old age dependency ratio
  - **D.** How does population ageing affect **assets, transfers and work**?

Ref: https://**www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf**

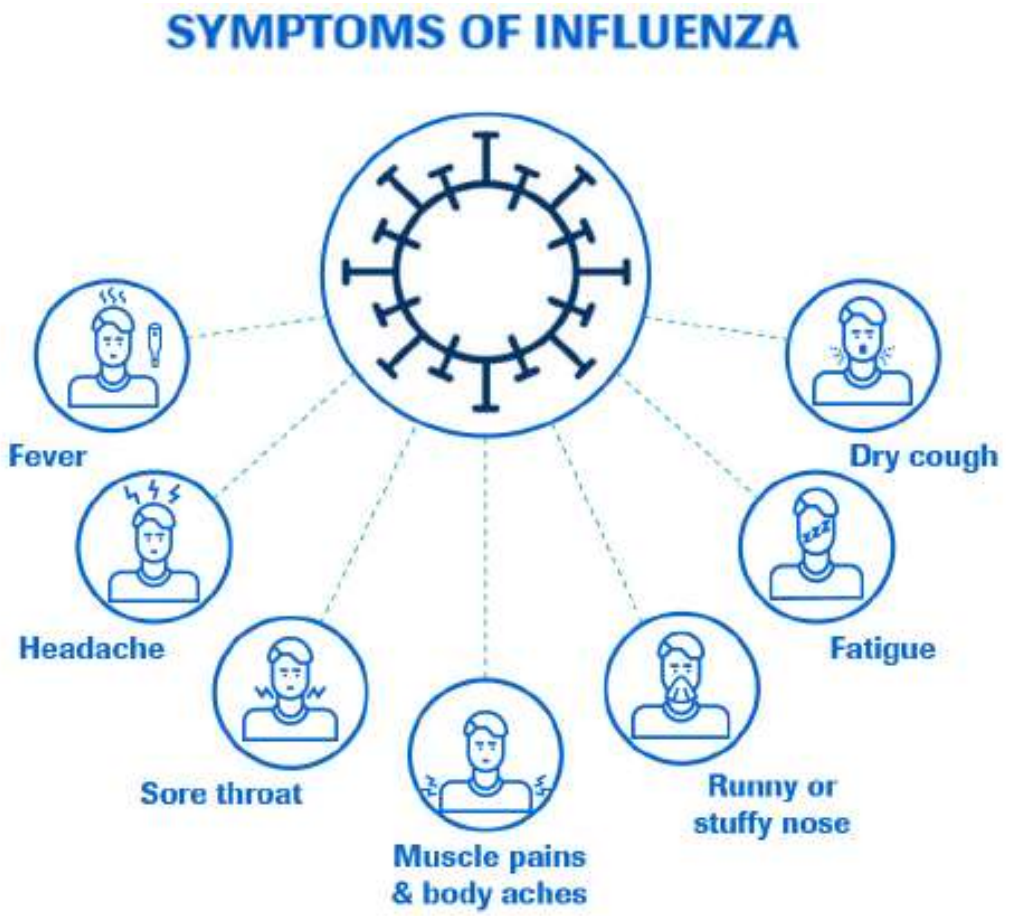
INTRODUCTION:

WHO definition of flu:

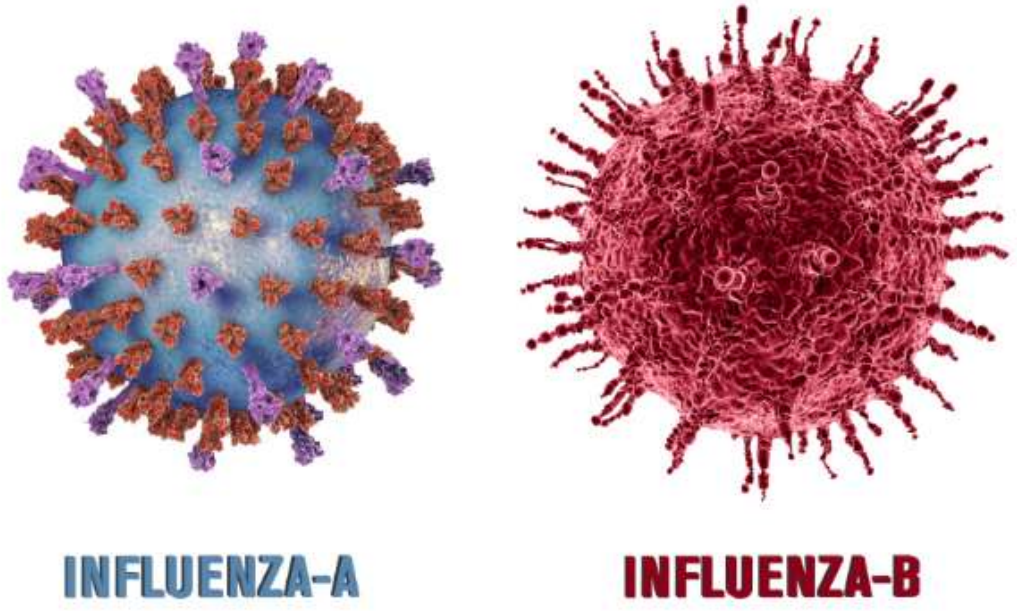
Major acute respiratory viral infection caused by influenza A (adult & child) or B viruses

- **Seasonal outbreaks**
- **Affect 2–10% population a year**

Seasonal influenza is an acute respiratory infection caused by different types and subtypes of influenza viruses.



ANNUAL SEASONAL FLU OUTBREAKS CAUSED BY INFLUENZA A AND B VIRUS INFECTIONS



The most seasonal flu epidemics

- **Origins of influenza:**

  When did the influenza virus first infect humans? Some scientists hypothesize that humans probably acquired influenza when they began **domesticating animals like birds and pigs**. The rise of agriculture and permanent settlements provided ideal conditions to trigger a flu epidemic.

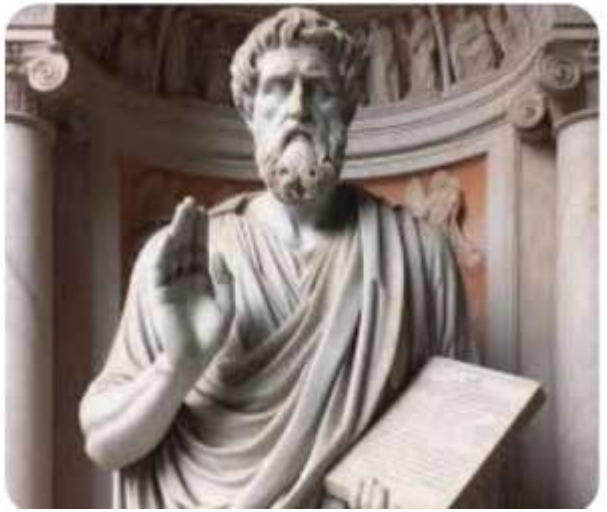
The regions of North America, Europe, East Asia, and South Africa have higher influenza activity during the **winter**.

In tropical and subtropical regions, the influenza pattern is less predictable and can occur **year-round, often with multiple peaks.**

412BC -Early evidence of influenza

While the flu has most likely been around for ages, no definitive historical records exist.

In his sixth book of "Epidemics," the Greek physician **Hippocrates** describes a highly contagious disease with flu-like symptoms. Modern doctors believe this may be the first reference of influenza (412BC).



https://www.flu.com/Articles/2022/The-History-of-Influenza

FLU HISTORY: INFLUENZA TERM & FIRST PANDEMIC

- 14th century- 1357 "La influenza" is coined:

La influenza comes from Italian, meaning **"visitation" or "influence**." epidemic in Florence, Italy "influenza di freddo," which translates to "cold influence."

Many astrologers in the Middle Ages believed that the **periodic return of the disease** was related to the "influence of heavenly bodies" or "influenza di stelle," meaning "influence of the stars."

- 16th century-1538 "The first flu pandemic":

Most epidemiologists agree that the 1580 influenza outbreak is the earliest recorded flu pandemic. It began in Asia during the summer before spreading to Africa, Europe, and eventually across the seas to the Americas. While the total death toll is unknown, it killed 8,000 people in Rome.

https://www.flu.com/Articles/2022/The-History-of-Influenza

FLU HISTORY

18th century

- **1729 "The first influenza pandemic":** t from Russia to Europe within 6-m -3 years.
- **1781:** China, spread to Russia, eventually reaching Europe and North America over the next year. 30,000 every day in St. Petersburg.

19th century

- **1830:** ships from China to the Philippines, India and Indonesia. After crossing Russia to Europe, it eventually reached North America. Mortality rate was low, impacted 20%–25% population.
- **1889: "First modern flu pandemic":**

- deadliest pandemics in history, the so-called Russian Flu
- **infected 40% of the world's population** and **killed about 1 million** people. Rapidly spread around the whole world due to the modern transport infrastructure of railroads and transatlantic sea travel.

https://www.flu.com/Articles/2022/The-History-of-Influenza

History of Influenza A and B viruses

*image credit CDC

Replacement of H1N1 with H2N2

Replacement of H2N2 with H3N2

Replacement of H1N1/77 with H1N1/09

1891	1918	1933	1942	1957	1968	1977	1987/88	1997	2005	2009	2013
H3N8 Russian pdm	H1N1 Spanish pdm	Influenza Virus	B virus Discovery	H2N2 Asian pdm	H3N2 Hong Kong pdm	H1N1 Children's pdm	B/Yam & B/Vic	H5N1	1918 seq	H1N1 2009 pdm	H7N9

Circulation of H1N1

Cir H2N2

Cir H3N2

50-100 million

2 million

1 million

Co-circulation of H1N1 & H3N2

2009 H1N1 emergence

FLU-WATCH SURVEILLANCE

Multicomponent surveillance system help achieve comprehensive information Weekly on :

- **circulating influenza strains**
- Extent to which they **match the strains** in the influenza **vaccines** and
- Proportion of tested strains that are **resistant to antivirals**

FLU HISTORY: SURVEILLANCE

20th century:

- **1918: The deadliest pandemic of the 20th century**

  new strain of the influenza A virus that started in birds (H1N1). **Spanish flu:** Europe, Asia and the United States, it rapidly spread around the world.

  30-35% of the world's population

  20 million to 50 million killed

- **1952 "WHO creates first system for surveillance":**

  WHO launched the first system for the surveillance of circulating influenza virus strains. This helped researchers to determine the composition of seasonal influenza vaccines.

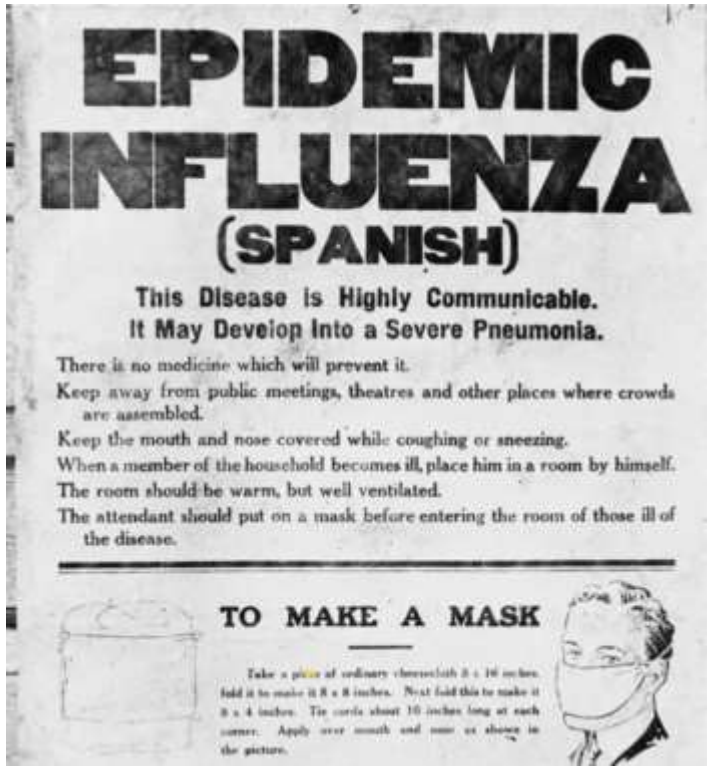
Early detection of (health) issues helps determine necessary corrective actions.

1918 influenza epidemic poster issued by the Board of Health in Alberta, Canada.

https://www.flu.com/Articles/2022/The-History-of-Influenza

FLU HISTORY: 20TH CENTURY:

This is the first picture of the new mask adopted and being



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FLU HISTORY

- **21st century: Swine Flu pandemic**

- **2009:** Swine flu affected children and young adults.
  - **Later in 2009, an H1N1 flu vaccine becomes available.**

Due to the rapid response of the CDC and WHO, a **vaccine** was quickly developed. The first doses were administered on October 5 of the same year.

https://www.flu.com/Articles/2022/The-History-of-Influenza

BURDEN OF INFLUENZA IN THE ELDERLY

Disparities & absence of stratified data:

- Access to healthcare resources,
- Quality of surveillance systems,
- Influenza vaccination rates,
- Healthcare-seeking behavior,
- Prevalence of risk factors for severe outcomes,
- **Elderly distribution** in the population with underlying medical conditions,
- New influenza virus strains,
- Varying effectiveness of seasonal influenza vaccines, and
- Shifts in population immunity over time
- **DATA GAP: Since 2018 less studies ……**

https://www.researchgate.net/publication/385547291_Systematic_Review_on_Influenza_Burden_in_Emerging_Markets_in_2018-2023-An_Evidence_Update_to_Guide_Influenza_Vaccination_Recommendations- 2024

FLU PREVALENCE

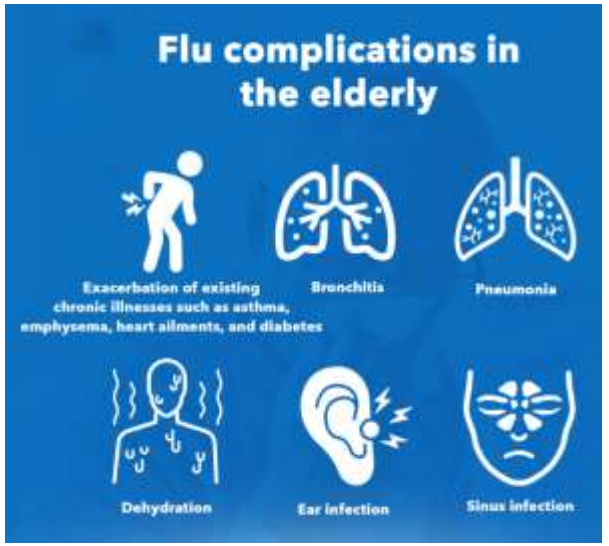
World Health Organization (WHO) estimated each year:

- 1 billion cases each year globally- (2-10%)
- Majority recover within a week without seeking medical attention,
- 3–5,000,000 severe infections, -(0.1% 1 out of 1000 cases)
- 290,000–650,000 deaths worldwide
- Exacerbation of overall epidemiologic burden:
- underlying comorbid conditions,
  - cardiovascular disease,
  - chronic respiratory diseases,
  - diabetes, obesity,
  - neurologic conditions, and
  - bacterial co-infections

WHY ARE ELDERLY AT RISK OF GETTING FLU?

- Immune system becomes more fragile:
  - Frailty and immuno-senescence lead to altered immune responses
  - Immunogenic response to the influenza vaccine is decreased among + 65 years
  - Develop illnesses and infections quickly and
  - More difficult time recovering from the infection

predisposing the elderly to severe influenza infection, AND extra-respiratory complications



According to the CDC, older adults 65 and older are at a greater risk of developing complications from influenza.

- Flu complications in the elderly
  - Exacerbation of chronic illnesses (asthma, emphysema, heart ailments, DM)
  - Bronchitis
  - Pneumonia
  - Dehydration
  - Ear infection
  - Sinus infection

Influenza Illness and Hospitalizations Averted by Influenza Vaccination in the United States, 2005–2011

Deliana Kostova, Carrie Reed, Lyn Finelli, Po-Yung Cheng, Paul M. Gargiullo, David K. Shay, James A. Singleton, Martin I. Meltzer, Pang-jun Lu, Joseph S. Bresee

Published: June 19, 2013 • https://doi.org/10.1371/journal.pone.0066312

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https://psshomecare.com/flu-in-the-elderly-/١٠١

GBD FLU

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Mortality, morbidity, and hospitalisations due to influenza lower respiratory tract infections, 2017: an analysis for the Global Burden of Disease Study 2017

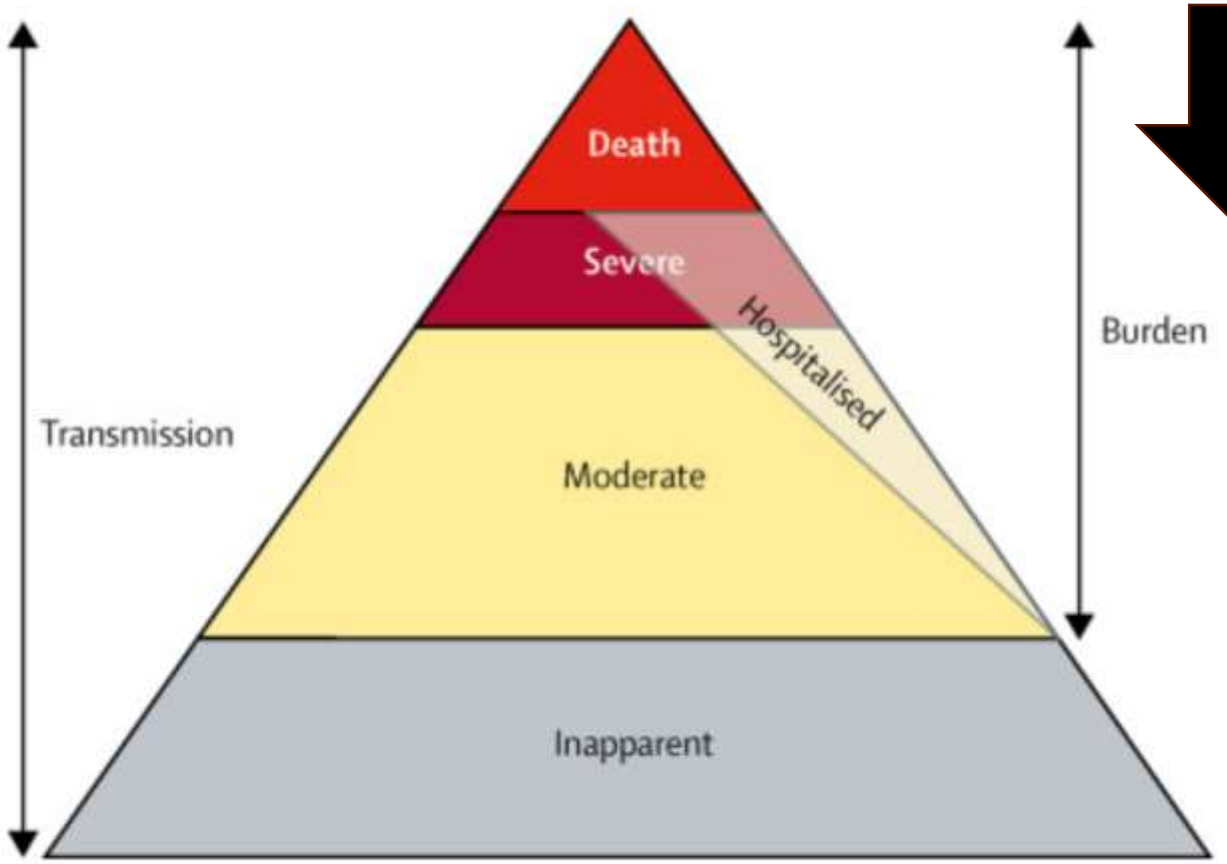

Figure 1 Conceptual diagram of the influenza LRTI burden pyramid

Transmission pyramid include asymptomatic infections, which, by definition, do not have a disease burden but might be crucial to the understanding of influenza transmission dynamics.

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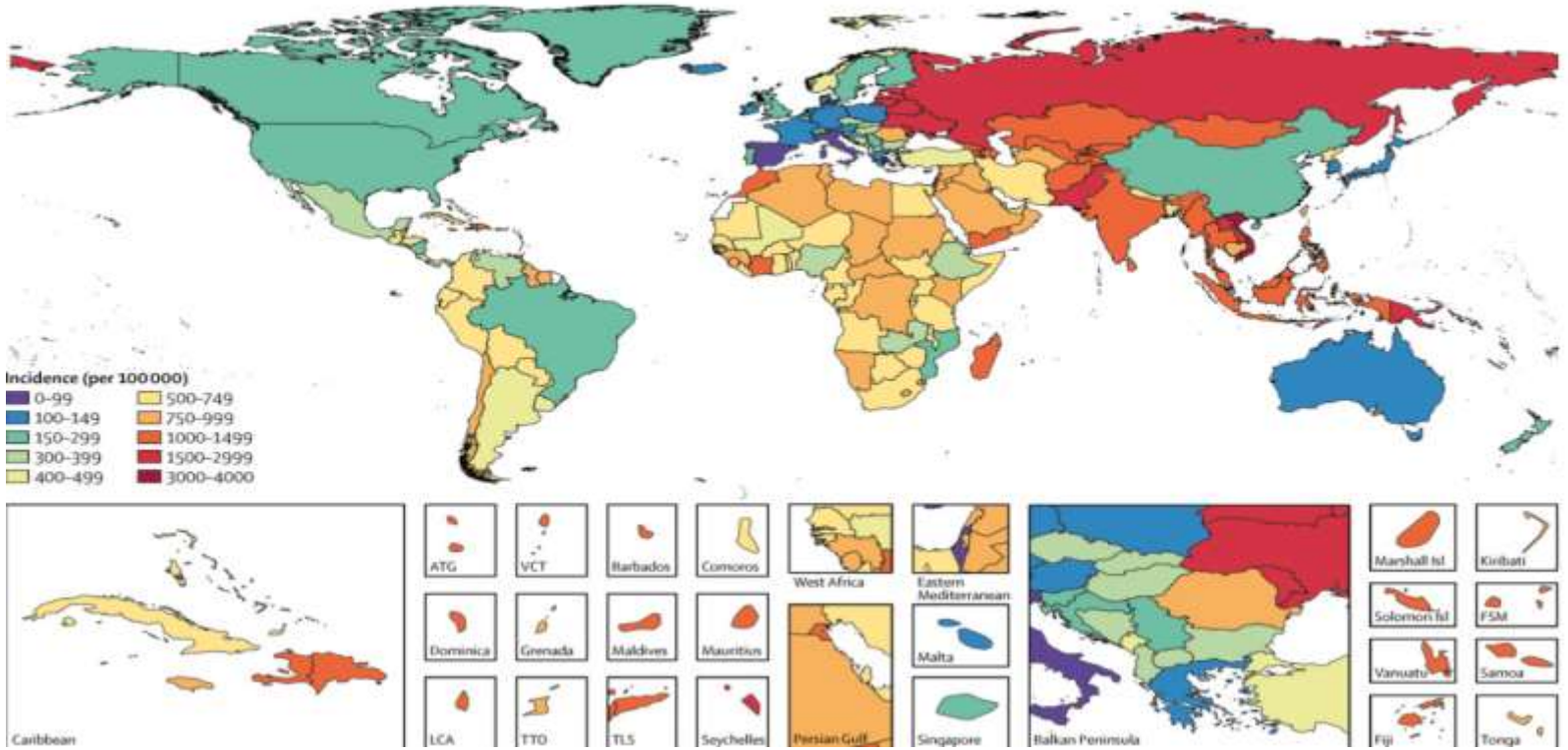

Influenza lower respiratory tract infection incidence per 100 000 for all ages, 2017

Among all ages, we estimated that 11·5% (95% UI 10·0–12·9) of LRTI episodes were attributable to influenza

The >70yrs more of LRTI episodes caused by flu (12%)

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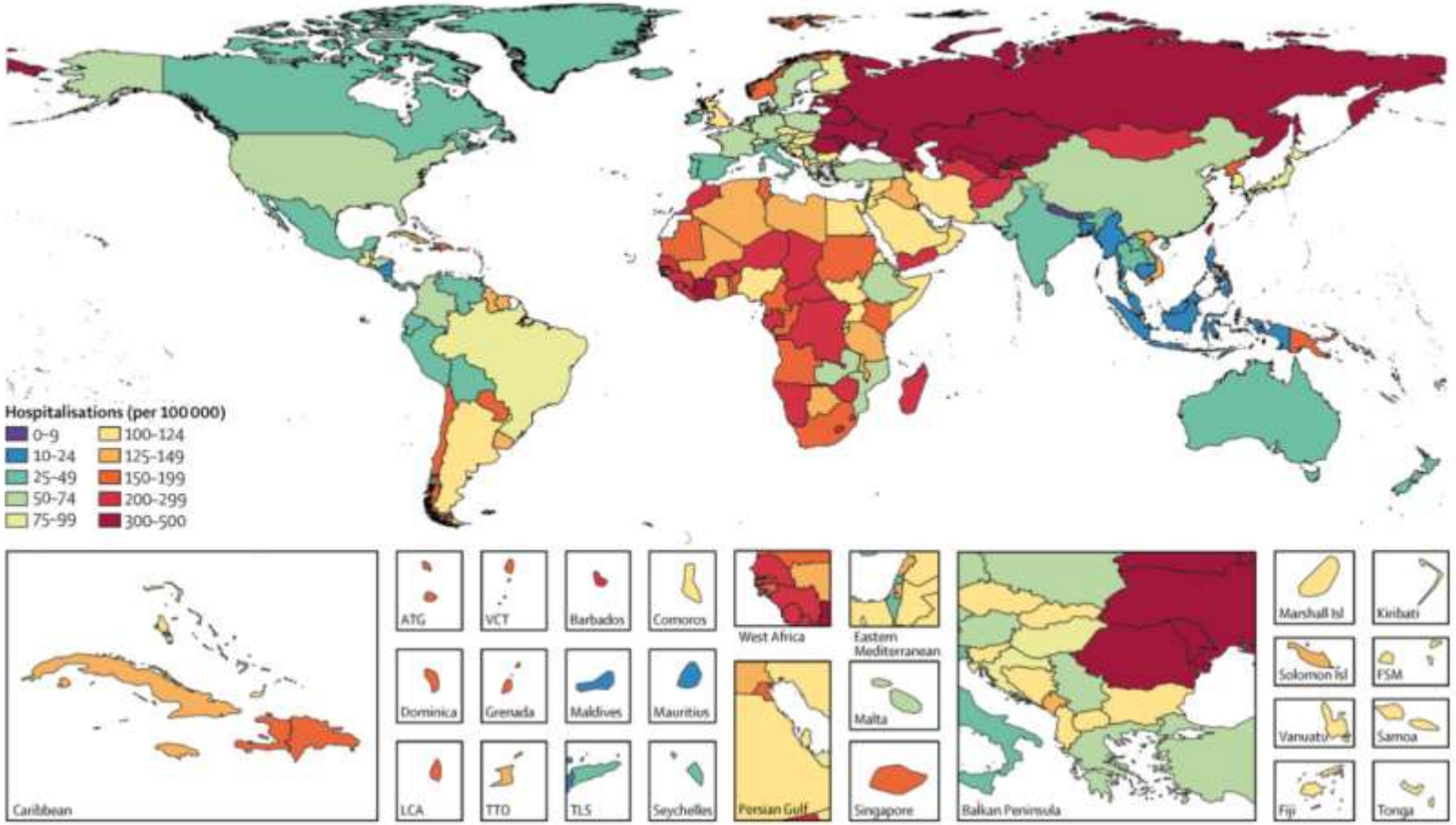

Influenza lower respiratory tract infection hospitalizations per 100 000 for all ages, 2017

The countries with the highest estimated rates of influenza LRTI hospitalisation per 100 000 population were **Lithuania** (560·7 [227·2–1351·7]) and **Russia** (494·4 [183·6–1241·6]), whereas **Nepal** (9·4 [3·2–25·7]) and **Bangladesh** (11·9 [3·7–33·8]) had the lowest rates per 100 000

The proportion hospitalized was highest in adults older than 70 years (appendix p 29)

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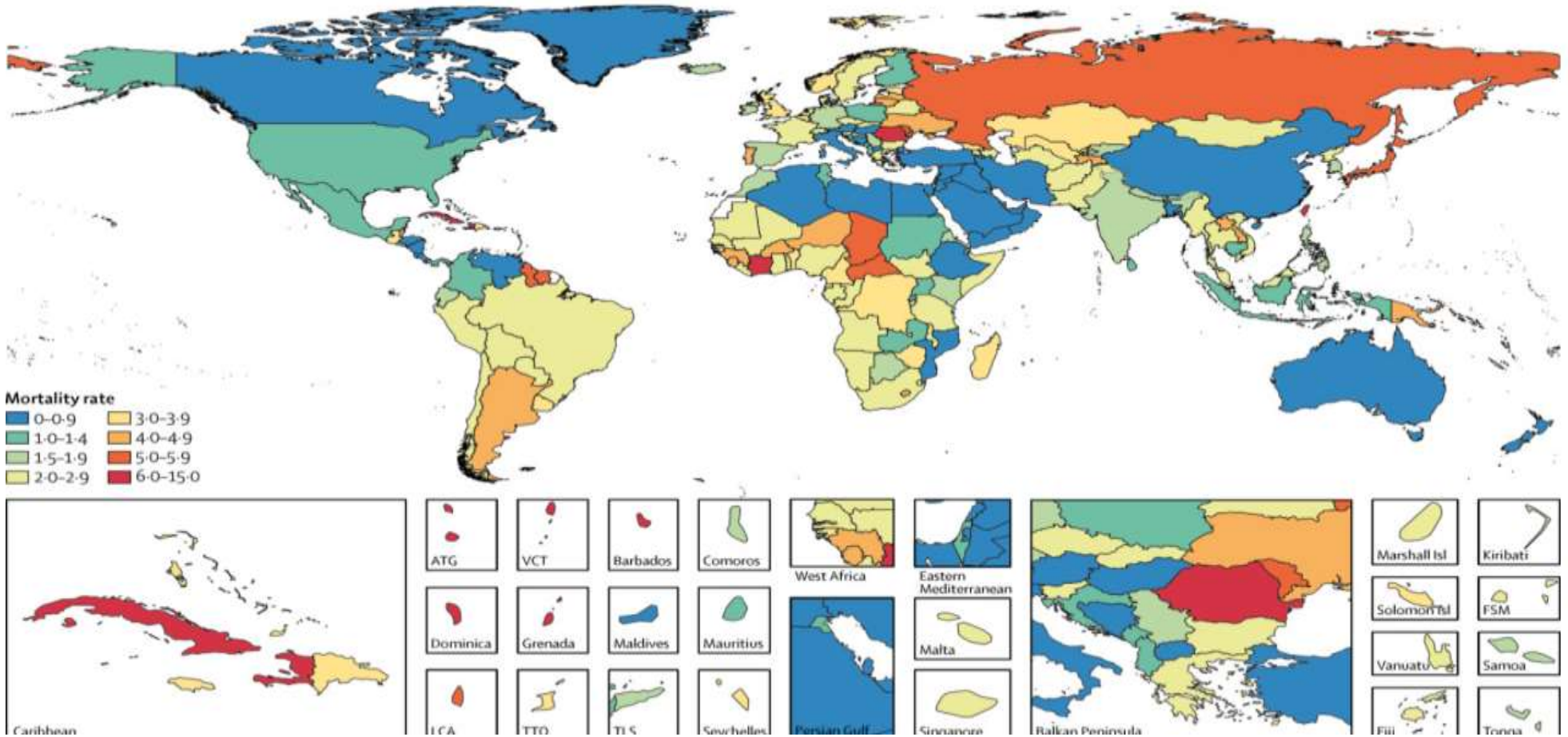

Influenza lower respiratory tract infection mortality rate per 100 000 for all ages, 2017

GBD FLU-LRTI: IRAN (2017)


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Mortality, morbidity, and hospitalisations due to influenza lower respiratory tract infections, 2017: an analysis for the Global Burden of Disease Study 2017

IRAN 2017 - Of 100,000 Influenza cases in Iran:

- **Incidence of LRTI**:
  - ❖No. of Cases: 482,000 (332,000-674,000)
  - ❖Rate: 578(404-821)/100,000
- **Hospitalizations**:
  - ❖No. of Cases: 84,000(29000-230,000)
  - ❖Rate: 110 (38-302)/100,000
- **Mortality:**
  - ❖ No. of Cases: 12,000(4000-32,000)
  - ❖Rate: 0.6 (0.3-0.9)/100,000

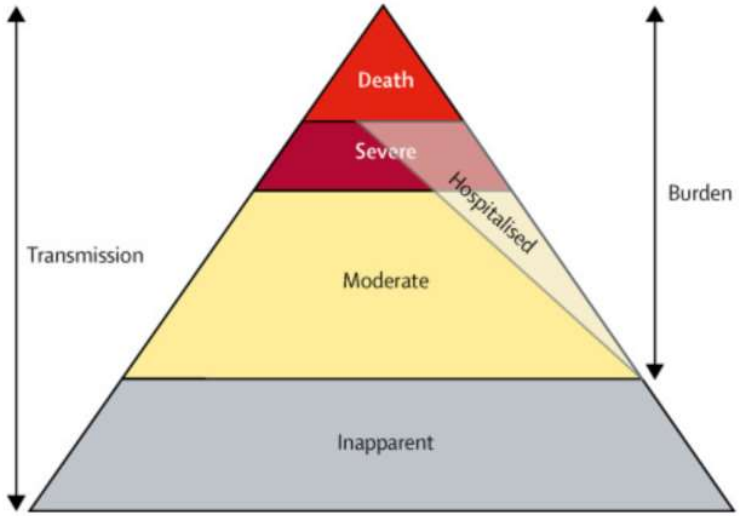
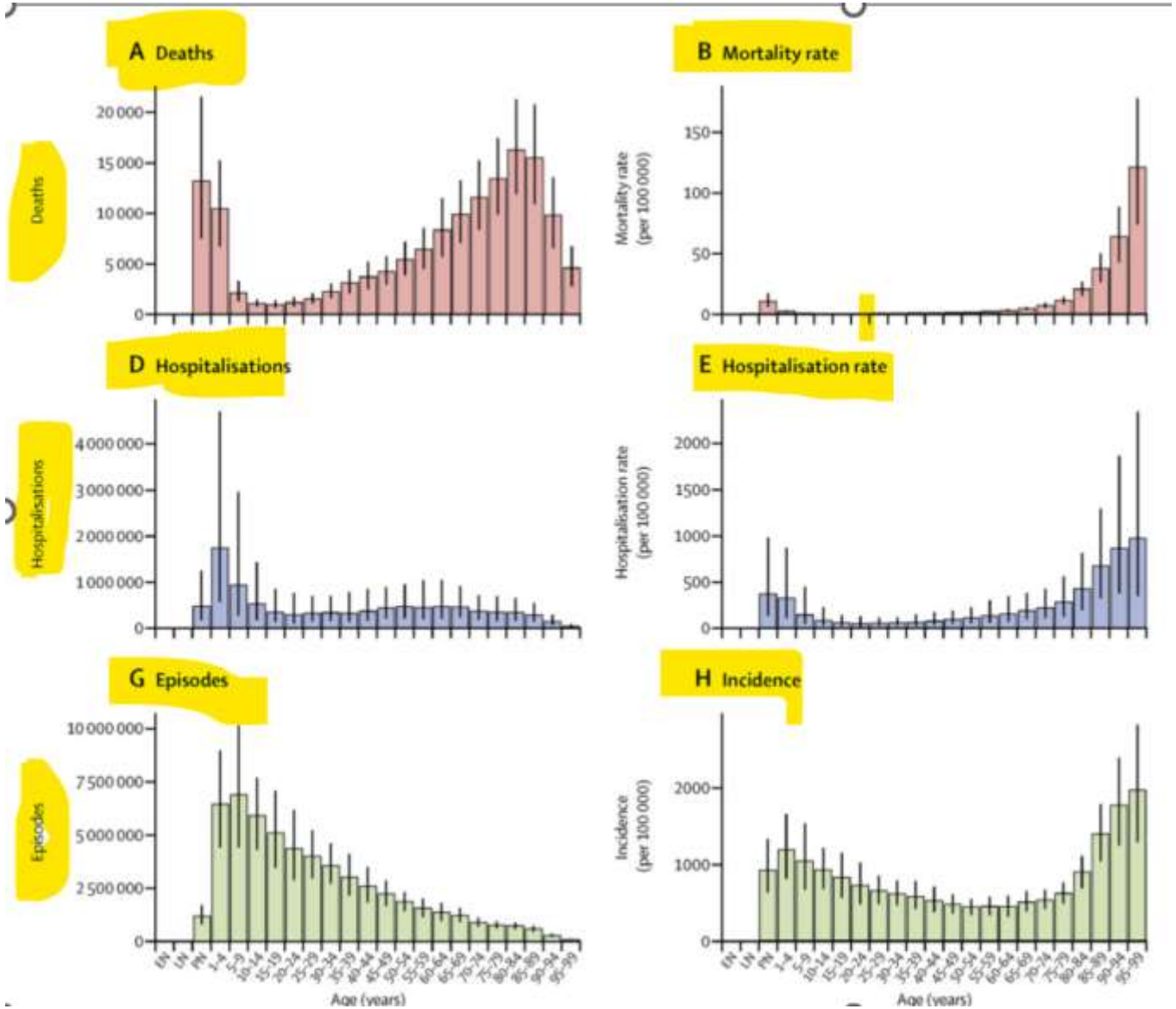


Figure 1 Conceptual diagram of the influenza LRTI burden pyramid

Age groups with the highest underlying rate of LRTI have the highest influenza LRTI burden



Elderly and flu

Age distribution of deaths attributed to influenza lower respiratory tract infections (A–C), hospitalisations attributed to influenza lower respiratory tract infections (D–F)

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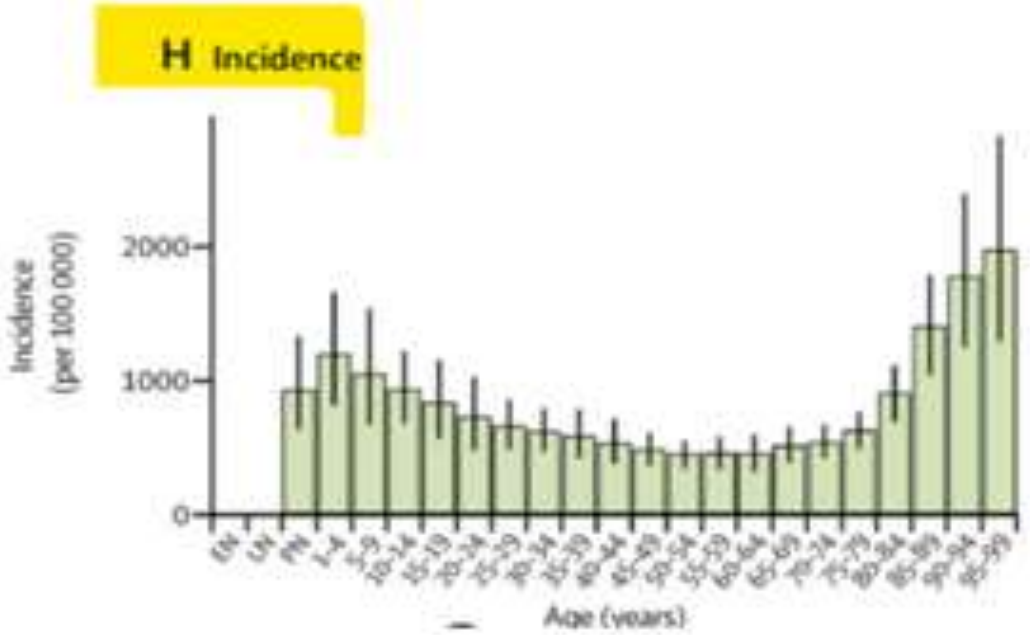
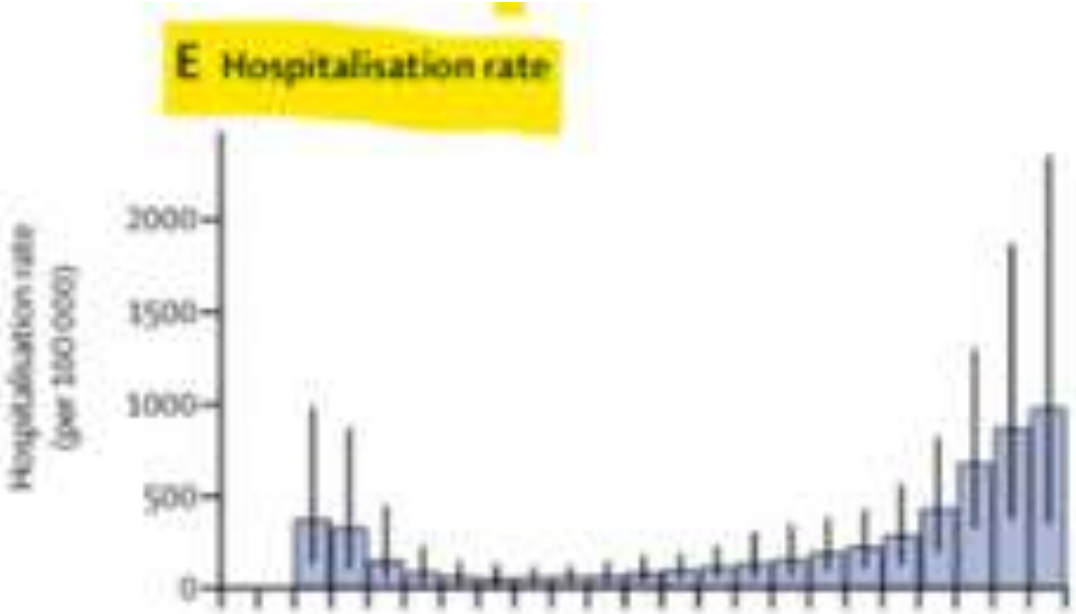
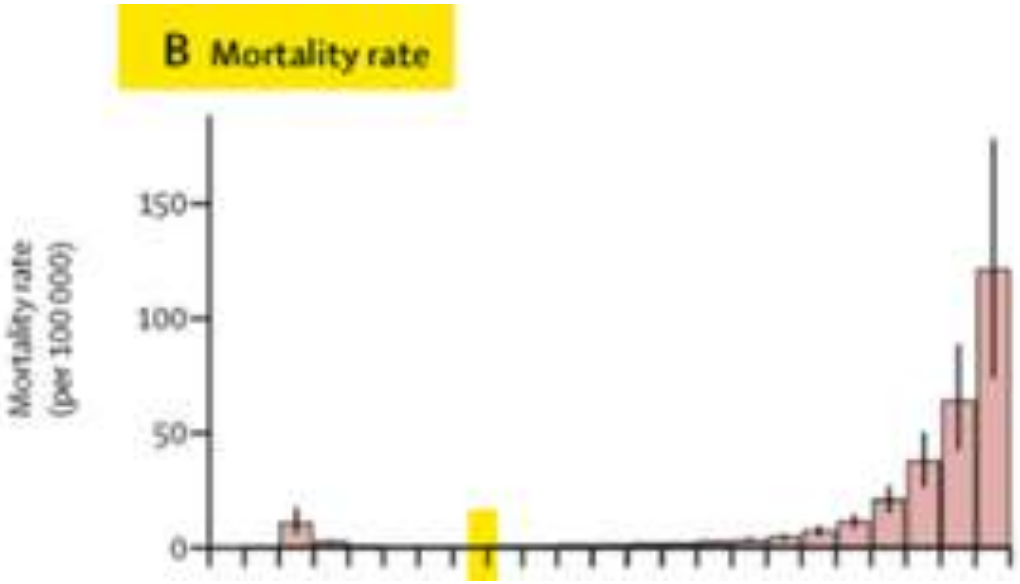
flu with LRTI by AGE

Age distribution of deaths attributed to influenza lower respiratory tract infections







GLOBAL BURDEN OF FLU

Global burden of influenza-associated lower respiratory tract infections and hospitalizations among adults: A systematic review and meta-analysis

Kathryn E. Lafond, Rachael M. Porter, Melissa J. Whaley, Zhou Suizan, Zhang Ran, Mohammad Abdul Aleem, Binay Thapa, Borann Sar, Viviana Sotomayor Proschle, Zhibin Peng, Luzhao Feng, Daouda Coulibaly, Edith Nkwembe, [...], Global Respiratory Hospitalizations–Influenza Proportion Positive (GRIPP) Working Group [view all]

Version 2 Published: March 1, 2021 • https://doi.org/10.1371/journal.pmed.1003550

The primary meta-analysis model (63 datasets of 110) found influenza associated with:

- **14.1%** (95% CI 12.1%–16.5%) of **acute respiratory hospitalizations** (all adults).
  - **Influenza A** viruses were associated with an estimated **10.6%** (95% CI 8.9%–12.5%) of these episodes, and
  - **influenza B** viruses with **3.5%** (95% CI 2.8%–4.3%)
- **influenza-associated hospitalizations** equated to:
  - 3,464,000 adults 20–64 years ~ **2,831,000 among ≥65 years**
- 80 (95% CI 44–139) hospitalizations/100,000 population <65 years and
- 437 (95% CI 265–612) hospitalizations/100,000 **older adults+65**

Hospitalizations each year: 5 times higher among older adults

https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1003550 2021

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Version 2 Published: March 1, 2021 • https://doi.org/10.1371/journal.pmed.1003550

LRTI influenza type A? or B?

- 4,264,000 (95% CI 2,185,000–7,353,000) influenza A–associated and
- 1,408,000 (95% CI 322,000–3,034,000) influenza B–associated,

Associated LRI episodes 75% type A

- 24,126,000 (95% CI 13,880,000–36,677,000) influenza A, and
- 7,966,000 (95% CI 1,650,000–15,426,000) influenza B

Virus influenza type A in 75%

https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1003550 2021

COST OF FLU

Adv Ther. 2024 Jan 23;41(3):945–966. doi: 10.1007/s12325-023-02770-0

The Cost of Seasonal Influenza: A Systematic Literature Review on the Humanistic and Economic Burden of Influenza in Older (≥ 65 Years Old) Adults

Jakob Langer [1,5,✉], Verna L Welch [2], Mary M Moran [2], Alejandro Cane [2], Santiago M C Lopez [2], Amit Srivastava [3], Ashley Enstone [4], Amy Sears [4], Kristen Markus [4], Maria Heuser [4], Rachel Kewley [4], Isabelle Whittle [4]

- **Economic impact, including**
  - **Direct costs** (e.g., drug consumption and hospitalizations),
  - **Indirect costs** (such as absenteeism and reduced productivity), and
  - **Intangible costs** (e.g., pain, suffering and impaired quality of life).

USA annual costs of influenza:

- Direct cost-of-illness: $1–3 billion- $10.4 billion
- Indirect costs- including loss of earnings: $10–15 billion - $16.3 billion
- Other estimates total economic burden of $87.1 billion.

FLU ELDERLY BURDEN

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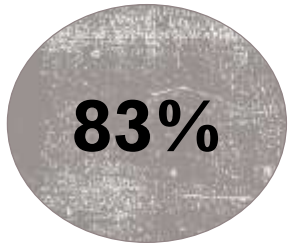
38 Studies: economic burden of influenza in ≥ 65 years

▪ **Estimated cost (in million$):**	**direct/**	**indirect/**	**total**
❖ Not medically attended but ill	$9.81/	$266.67/	$276.48
❖ Office-based outpatient visits	$16.24/	$15.60/	$31.85
❖ Emergency department	$70.86/	$11.42/	$82.28
❖ **Hospitalization**	**$1273.73/**	**$40.45/**	**$1314.18**
❖ **Deaths**	**NR/**	**$710.1/**	**$710.1**
❖ **Total**	**$1370.64/**	**$1044.24/**	**$2414.88**



https://pmc.ncbi.nlm.nih.gov/articles/PMC10879238/

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humanistic burden of influenza in ≥ 65 years

QALYs/QALDs and HRQoL, Patient satisfaction and preference, Impact on daily living (7-9days), Functional decline (4-8d), Transition to assisted care, Impact of long-term symptoms (ranged between 2 and 15 days)/complications, Time to return to baseline(4-15), Caregiver reported symptoms(1-3d), QoL, and HRQoL, **Extra GP**/ER visits, Incidence and duration of hospital/ICU stays, Pharmacy costs, Short- and long-term care, Progression to secondary infection, Absenteeism for patients and caregivers(average of 4.9 lost workdays)

https://pmc.ncbi.nlm.nih.gov/articles/PMC10879238/

FLU ELDERLY BURDEN

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38 Studies: economic and humanistic burden of influenza in ≥ 65 years

- **Mean** patient **out-of-pocket/co-pay** by age group in 2018:
  - 65–74 years = $1065 (SD 807)
  - 75–84 years = $1000 (SD 790)
  - ≥ 85 years = $896 (SD 813)
- **Mean** patient **out-of-pocket/co-pay** by sex (2018 USD):
  - Male = $971 (SD 790)
  - Female = $999 (SD 806)

https://pmc.ncbi.nlm.nih.gov/articles/PMC10879238/

FLU ELDERLY BURDEN

38 Studies

Adv Ther. 2024 Jan 23;41(3):945–966. doi: 10.1007/s12325-023-02770-0

The Cost of Seasonal Influenza: A Systematic Literature Review on the Humanistic and Economic Burden of Influenza in Older (≥ 65 Years Old) Adults

Jakob Langer [1,5✉], Verna L Welch [2], Mary M Moran [2], Alejandro Cane [2], Santiago M C Lopez [2], Amit Srivastava [3], Ashley Enstone [4], Amy Sears [4], Kristen Markus [4], Maria Heuser [4], Rachel Kewley [4], Isabelle Whittle [4]

Economic and humanistic burden of flu ≥ 65 years

The **median overall costs (USD) for patients** at

- High risk of severe influenza were $2340 (*n* = 23,080) vs
- Low risk patients median cost of $1295 (*n* = 2553)

https://pmc.ncbi.nlm.nih.gov/articles/PMC10879238/

FLU VACCINATION

FULL LENGTH ARTICLE · Volume 125, P153-163, December 2022 · Open Access · Download Full Issue

Global influenza vaccination rates and factors associated with influenza vaccination

Can Chen [1,#] · Xiaoxiao Liu [1,#] · Danying Yan [1,#] · ... · Jie Wu [1,$] · Lanjuan Li [1,$]

Global influenza vaccination rates:

- 25% in the general population,
  - 42% in persons with chronic diseases,
  - 37% in healthcare workers, and
  - 26% in pregnant women

522 studies from 68 countries/regions

European region (247 studies),
Western Pacific (135 studies),
American regions (100 studies)
ASIA=<50 papers

Geographic differences were highlighted, with relatively

- High influenza vaccination rates in the American region,
- Low rates in the European and Western Pacific regions, and even
- Lower rates in the Eastern Mediterranean, Southeast Asian, and African regions

Absence of cross-regional comparisons of influenza disease burden limits our understanding of the global variability in influenza impact hinders the development of targeted and effective public health strategies (e.g., vaccine programs) that cater to the specific needs of different regions

FLU VACCINATION

522 studies from 68 countries/regions

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Strategic Advisory Group of Experts on Immunization (SAGE):

- **Healthcare workers and**
- **Older adults**

https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1003550 2023

FLU WORLD GENERAL POPULATION VACCINE

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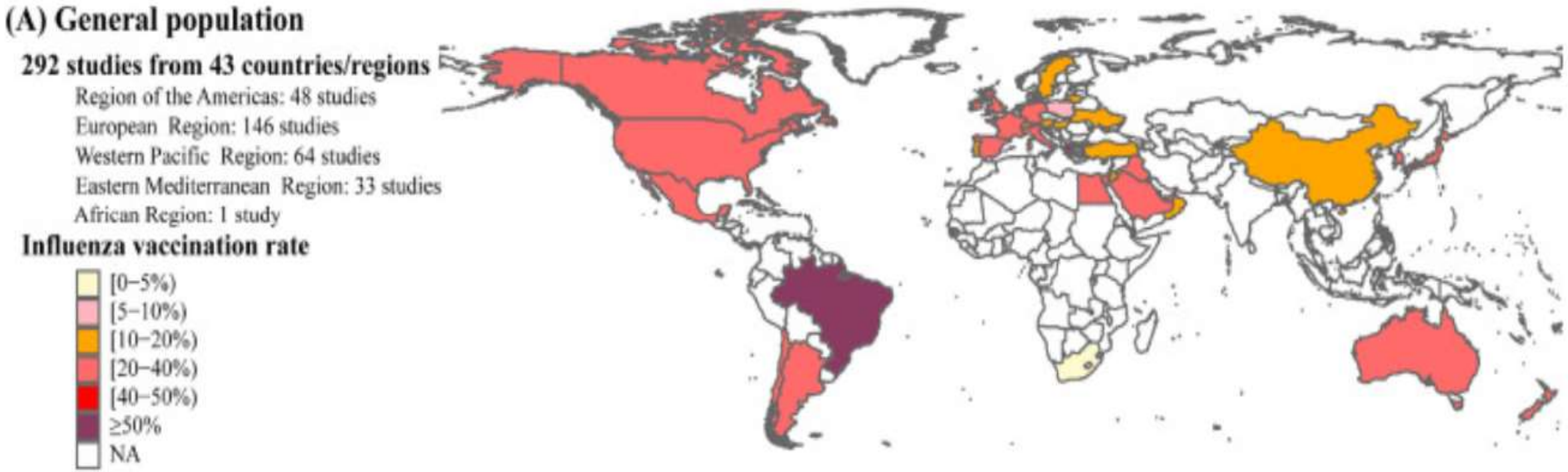
Can Chen [1,#] · Xiaoxiao Liu [1,#] · Danying Yan [1,#,*] ... · Jie Wu [1,$] · Lanjuan Li [1,$,*]



FLU CHRONIC DIS. VACCINATION

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Can Chen [1,#] · Xiaoxiao Liu [1,#] · Danying Yan [1,#] · ... · Jie Wu [1,$] · Lanjuan Li [1,$] ·

FLU HEALTH WORKERS VACCINATION

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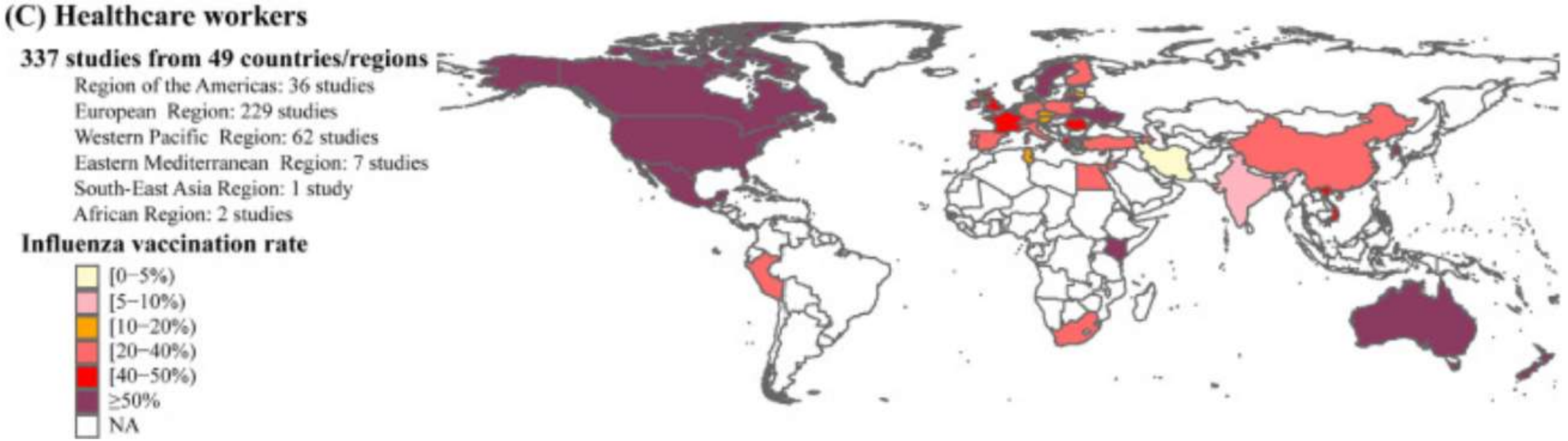

FLU EPI VACCINE BY AGE

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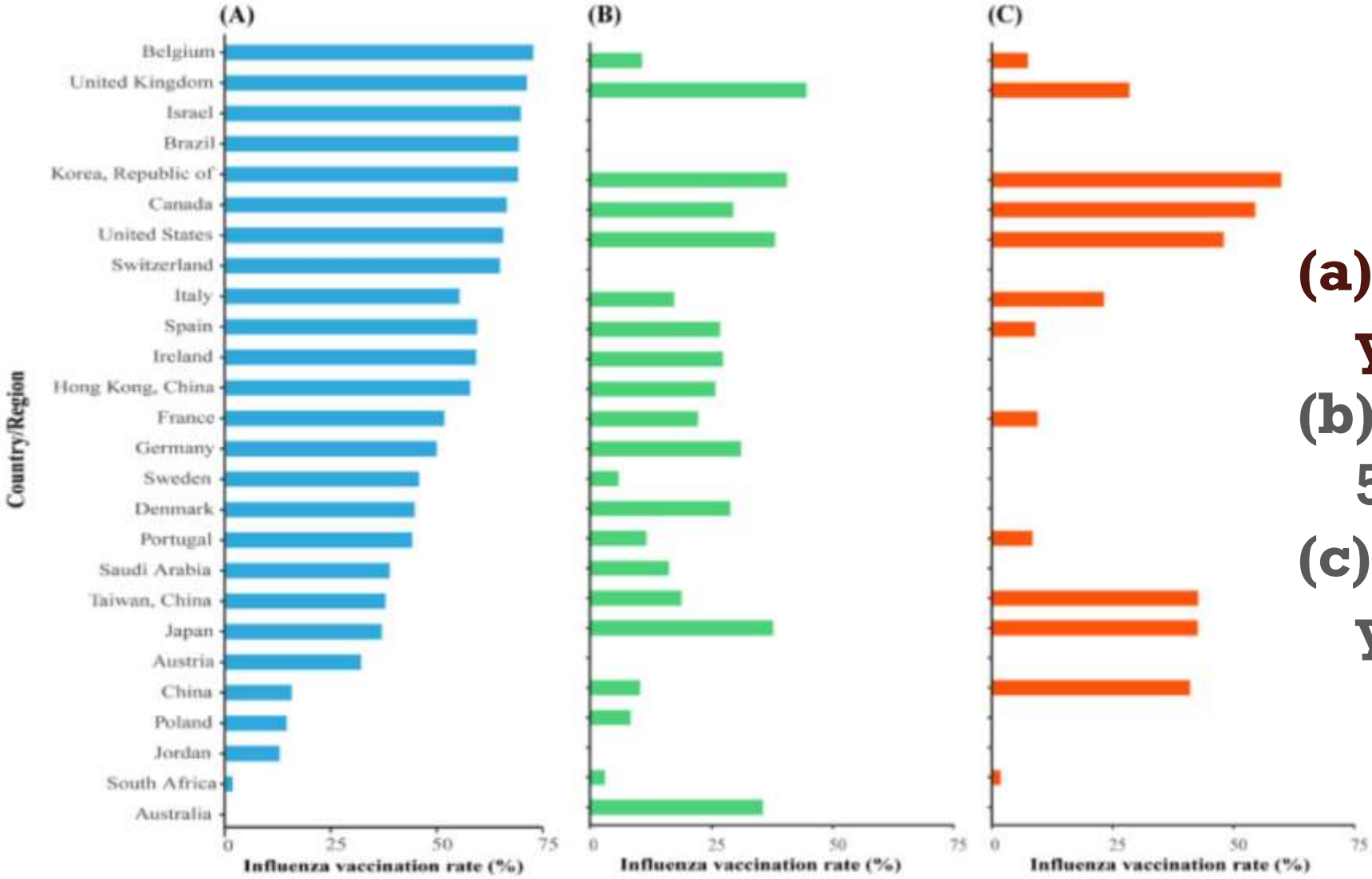
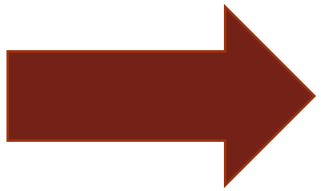


(a)Pooled IVRs in ≥60 yrs- 25 countries

(b)Pooled IVRs in 15-59yrs-21 countries

(c)Pooled IVRs in ≤14 yrs-13 countries

FLU VACCINATION COVERAGE WHO DATABASE: DEC. 2024- RAN



World Health Organization | Health Topics | Countries | Newsroom | Emergencies | Data | About us

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Country / Region	Antigen	Data source	2023	2022	2021	2020	2019	2018
	Influenza all persons above >6 months (universal recommendation)	ADMIN						
	Influenza child age group 1	ADMIN				0%		
	Influenza child age group 2	ADMIN						
	Influenza chronic adult	ADMIN	11%			11%		
	Influenza chronic children and adults	ADMIN				11%		
Iran (Islamic Republic of)	Influenza chronic pediatric	ADMIN						
	Influenza health care workers	ADMIN	81%			81.25%		
	Influenza older persons	ADMIN	2.5%			2.5%		
	Influenza pregnant women	ADMIN				37.5%		
	Influenza residents living in long term care facilities	ADMIN	63%			62.5%		
	Influenza travellers (incl. Hajj pilgrimage)	ADMIN				0%		

Percentage in the target population who receives flu vaccines/ in a given year.

https://immunizationdata.who.int/global/wiise-detail-page/influenza-vaccination-coverage?CODE=IRN&ANTIGEN=&YEAR

THE EFFICACY OF INFLUENZA VACCINE IN ELDERLY PERSONS: A META-ANALYSIS AND REVIEW OF THE LITERATURE

The pooled estimates vaccine efficacy>65 years:

- 56% prevent respiratory illness,
- 53% prevent pneumonia,
- 50% prevent hospitalization and length,
- 30% prevent ICU admission,
- 50% prevent mechanical ventilation,
- 36- 68% prevent death

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522 studies from 68 countries/regions

If IVRs reach 40% nationally, it could also effectively prevent and control the scale of the influenza epidemic

If IVRs reach 70% nationally, it effectively prevent & control:

- 80% less illness
- 75% medically attended illnesses
- 47%less hospitalization

FLU VACCINATION GOAL

- The World Health Organization (WHO) has suggested that IVRs should reach **75%** among **older adults and individuals with chronic diseases**

- U.S. 2030 public health initiative aims to achieveflu vaccine coverage **“well-being free of preventable diseases” 70% of all eligible people each season.**

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. Factors for vaccination uptake:

- **A free national** or regional vaccination policy,
- **Perception** of influenza vaccine efficacy and disease severity,
- Recommendation from **healthcare workers**, and
- Having a **history of influenza vaccination**

► Can J Hosp Pharm. 2015 Jan-Feb;68(1):60–63. doi: 10.4212/cjhp.v68i1.1427

Should Influenza Immunization Be Mandatory for All Health Care Providers?

PMCID: PMC4350503 PMID: 25762822

- "First, do no harm." This famous line is from the **Hippocratic Oath**, which all physicians swear to uphold when they enter their profession.

Unvaccinated health care professionals place themselves and their patients at risk for influenza.

FLU VACCINE BARRIERS IN HEALTH CARE WORKERS

Acta Biomed. 2021 Mar 25;92(Suppl 2):e2021004. doi: 10.23750/abm.v92iS2.11106

Influenza vaccination and healthcare workers: barriers and predisposing factors. A literature review

Assunta Guillari [1], Francesco Polito [1], Gianluca Pucciarelli [2], Nicola Serra [1], Gianpaolo Gargiulo [3], Maria Rosaria Esposito [4], Stefano Botti [5,✉], Teresa Rea [1], Silvio Simeone [2]

Barriers to vaccination identified health care workers: 2021 published

- Fear of contracting influenza from the vaccination itself;
- Not considering themselves at risk;
- To believing believe that their immune system is capable of managing a trivial disease;
- Disease considered trivial,
- Laziness;
- False beliefs

Identified facilitators:

- Desire for self-protection,
- Protection for loved ones and community

VACCINE BARRIER & PROMOTER IN POP.

Combination of limited vaccine **knowledge** and **negative attitudes** towards healthcare services

20 studies vaccine barrier in population: 2023 published

	total	unvaccinated
Lack of trust	21%	14%
Lack of knowledge	19%	32%
Cost	15%	27%
Social barriers	14%	14%
Psychological	13%	22%
Access	10%	13%
Health condition	2%	2%

20 studies vaccine promoter in population: 2023 published

	total	vaccinated
Trust	68%	79%
Social	48%	46%
Cost	44%	41%
knowledge	44%	52%
Access	32%	26%
Psychological	20%	11%

Vaccines (Basel). 2023 Jan 13;11(1):180. doi: 10.3390/vaccines11010180

Understanding the Barriers and Attitudes toward Influenza Vaccine Uptake in the Adult General Population: A Rapid Review

Verna L Welch [1,*], Tom Metcalf [2], Richard Macey [2], Kristen Markus [2], Amy J Sears [2], Ashley Enstone [2], Jakob Langer [3], Amit Srivastava [4], Alejandro Cane [1], Timothy L Wiemken [1]

DO WE NEED TO APPROACH OLDER ADULTS DIFFERENTLY?

Massage to take home

- Now and future of aging
- Elderly characteristics
- Flu burden: aging
- Flu vaccine

PREVENTION STRATEGIES

- **Primordial Prevention**

Risk factor reduction (through laws and national policy).

Underlying disease (physical activity; obesity, cardiovascular disease, type 2 diabetes, etc.)

- **Primary Prevention**

Prevent a disease from ever occurring. (limit risk exposure or increase the immunity by immunizations

- **Secondary Prevention**

Early disease detection: Secondary prevention often occurs in the form of screenings.

- **Tertiary Prevention**

Tertiary prevention targets symptomatic patients and aims to reduce the severity of the disease as well as any associated sequelae.

- **Quaternary Prevention**

Action taken to identify patients at risk of overmedicalization, to protect him from new medical invasion, and to suggest to him interventions, which are ethically acceptable. "an action taken to protect individuals (persons/patients) from medical interventions that are likely to cause more harm than good."

The official flower of National Grandparents' Day is the forget-me-not, which blooms in the spring, small blue flowers that grow anywhere from 4 to 12 inches.

Represents remembrance and long-associated with dementia. People with dementia may experience memory loss, among other symptoms. This makes the forget-me-not the perfect flower to represent our cause.