Influenza-like-illness and severe acute respiratory illness cases in Kenya: Burden estimates and associated factors 2019 –2023

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27/09/2024

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Introduction

- Influenza is a communicable viral respiratory illness
  - Transmission - respiratory droplets

- Symptoms: 5-7 days post-infection
  - Cough, high fever, runny nose, and sore throat

- Globally: 1 billion cases are estimated annually (WHO, 2020)
- Sub-Saharan Africa, including Kenya, reports higher mortality rates
  - 2·8–16·5 deaths per 100,000 individuals (Gachari et al., 2022)

- Influenza shows seasonality in cold months, but in Kenya and tropical regions, it circulates year-round with sporadic outbreaks

Problem Statement

- The prevalence of influenza in Kenya is estimated at 19% between 2013 and 2017 (Umuhoza et al., 2020)

- Influenza is a major cause of hospitalization and mortality in Kenya (Matheka et al., 2013)
  - 290,000-650,000 respiratory deaths annually (WHO, 2020)
  - < 2 years, > 65 years, pregnant women, and individuals with chronic illnesses (Gachari et al., 2022)

- Influenza has a socioeconomic impact
  - Treatment costs, lost productivity, and increased hospitalizations (Zipfel et al., 2021)

- Preventable – vaccination, hand and respiratory hygiene

Study Objectives

1. To describe the characteristics of the ILI and SARI cases in Kenya, January 2019 - April 2023

2. To estimate the burden of Influenza-Associated SARI/Respiratory hospitalization at influenza surveillance sentinel sites in Kenya, January 2019 - April 2023

3. To evaluate influenza-associated risk factors among the ILI and SARI cases in Kenya, January 2019 - April 2023

Methods

ILI case
- Acute respiratory infection
- Measured fever of ≥ 38 C° and
- Cough with onset within the last ten (10) days

SARI case
- Acute respiratory infection requiring hospitalization
- Measured fever of ≥ 38 C° and
- Cough with onset within the last ten (10) days before hospitalization

Study site: 8 sentinel facilities

Study population: ILI and SARI Cases

Study design: Cross-sectional study

Variables

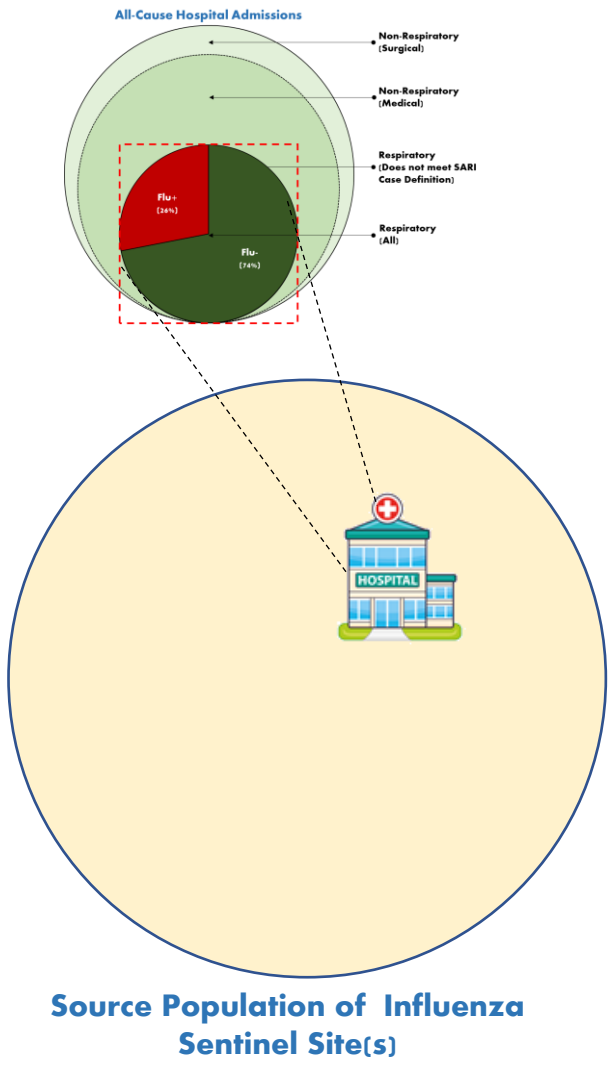
- **Predictor Variables**: Demographic information, clinical features, and exposure factors, virological data
- **Outcome variable:** Influenza positive tests

Data collection and management

- Abstraction tool: MS Excel Password-protected computers and de-identification before analysis

Data Analysis: MS Excel, Epi Info

Influenza-Associated All-Respiratory Hospitalization Rate per 100,000 Population (using HAS)



Calculations:

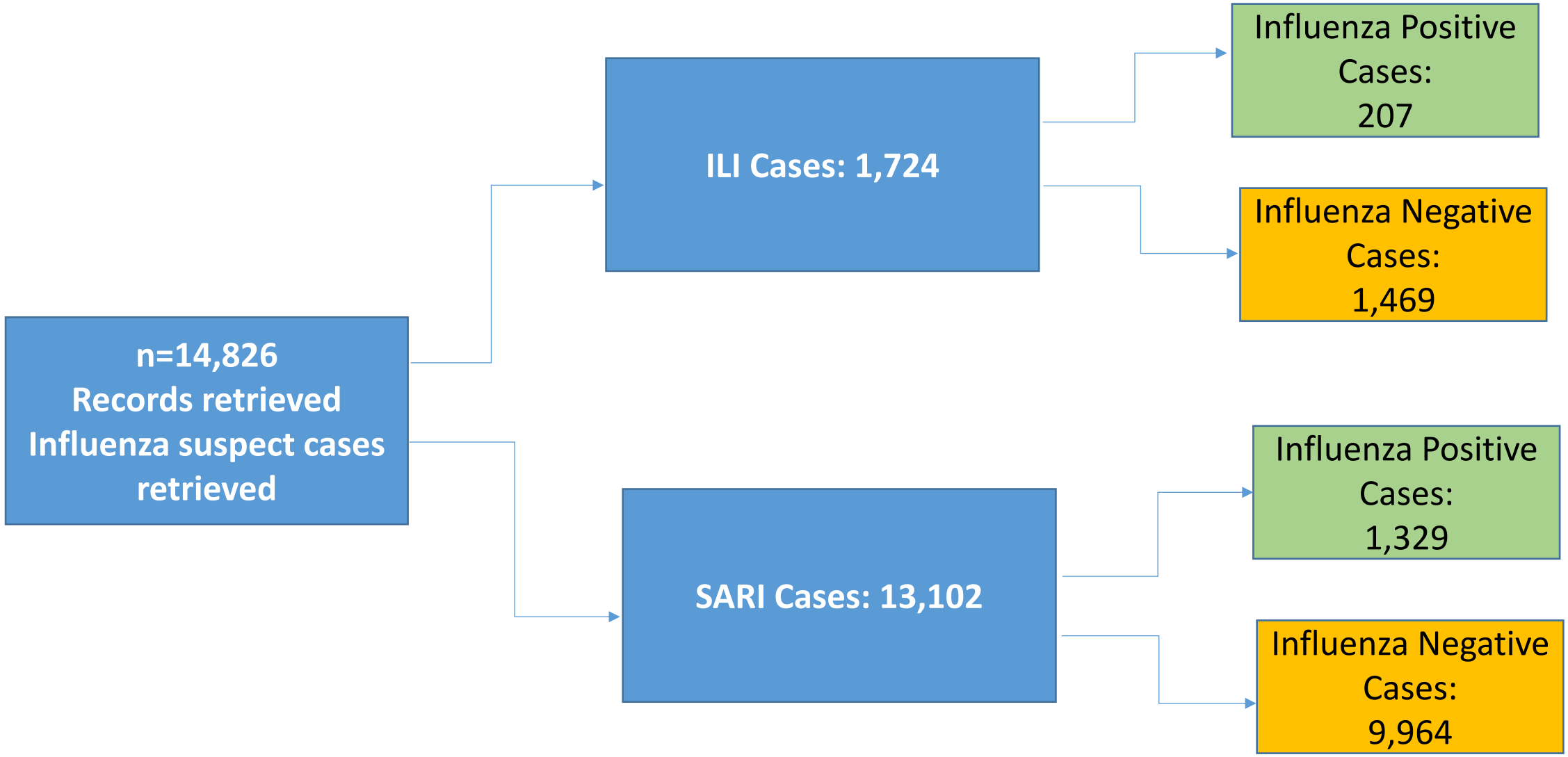
- Total tested: 1227
- Flu+: 177
- Total Respiratory Admissions: 1264 (SS)
- Total Respiratory Admissions: 209,916 (All hospitals in the catchment area of SS)
- Catchment Area Population: 67,315

- Step 1 - Numerator: Total Influenza All-Respiratory Admissions (SS): 177/1227*1264=182

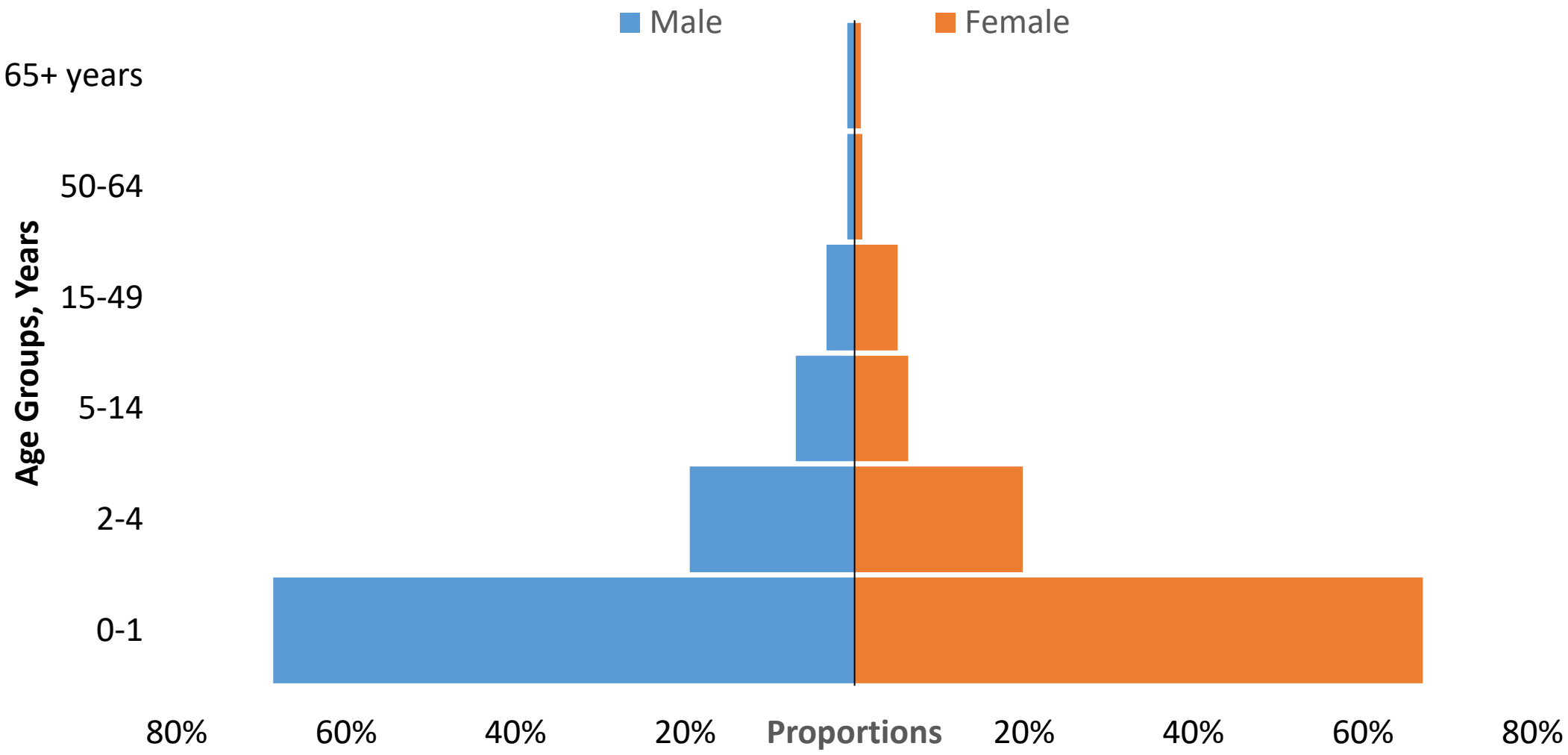
- Step 2 - Denominator: Source Population (SS): 67,315*(1264/209,916)= 405

- Step 3 – Rate: Influenza Respiratory Hospitalization Rate: 182/405*100,000=44,984 per 100,000 population

Results: Enrolled ILI & SARI Cases

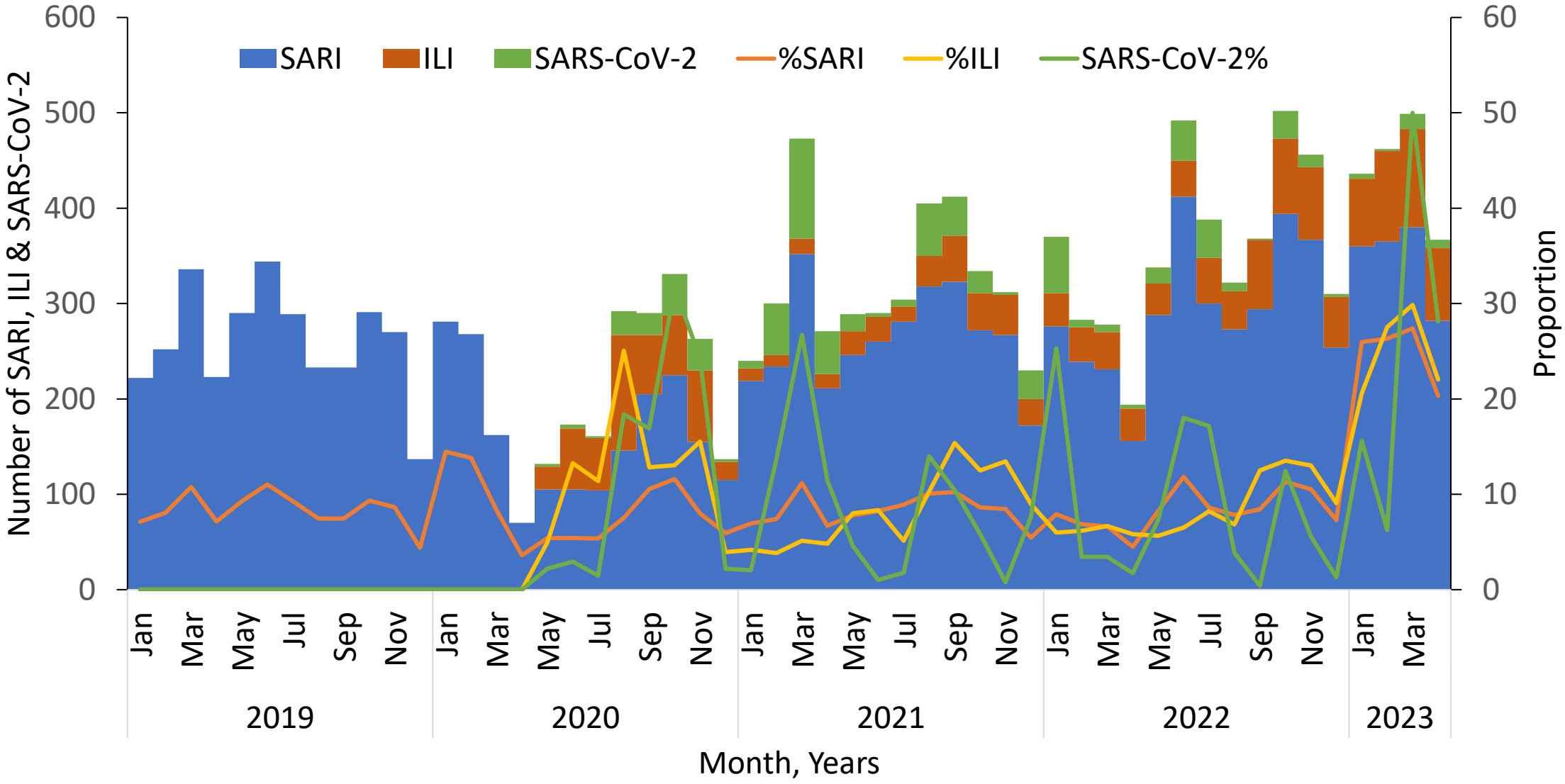


Age and Gender Distribution of ILI/SARI Cases



Overall positivity rate: 11.8% (1,536/12,969), Mortalities: 2.3% (30/1317)

Trend analysis of ILI/SARI Cases, 2019-April 2023



Influenza Burden Estimates for the eight Sentinel Sites in Kenya, Jan 2019-April 2023

Site	Incident Rate/100,000 population	Incidence-rate Ratio (IRR)
Nakuru CRH	44984	103.36
Kakamega CRH	14884	34.20
Kenyatta NH	13044	29.97
Nyeri CRH	9159	21.05
Marsabit CRH	8428	19.37
Kakuma IRC	8072	18.55
Daadab	2130	4.89
Mombasa CRH	435	Ref

Factors associated with positive Influenza cases

Risk Factors		Influenza positive (Cases)	Influenza Negative (Controls)	*POR (95% CI, lower - upper)*	*P value*
Gender	Male	874	6358	1.05 (0.9-1.2)	0.34
	Female	662	5075		
Close contact	Yes	158	610	2.06 (1.7 – 2.5)	0.00*
with an ARI	No	1004	8006		
Health worker	Yes	1	62	0.11 (0.01 – 0.86)	0.01*
	No	1245	9255		
Travelled in the	Yes	14	116	0.91 (0.5 – 1.6)	0.11
14 days prior to	No	1217	9141		
symptom onset					
Pregnancy	Yes	6	21	2.8 (1.1 – 7.4)	0.03*
	No	35	344		
HIV/AIDS	Yes	5	79	0.47 (0.19 – 1.17)	0.09
Infection	No	1483	11073		
Malaria Infection	Yes	142	1210	0.79 (0.65 – 0.97)	0.02*
	No	572	3898		

Discussion

- SARI cases have more young children (Cheng et al., 2017)
- Factors associated: Close contact with ARI cases & pregnancy (Hasan et al., 2021)
- Nakuru & Kakamega sites had high incident rates
  - Population movement could be due to population movement & birds' migratory paths
- High proportion of Influenza negative ILI and SARI cases (Gachari et al., 2022)
- Influenza is associated with pneumonia, sepsis, and malnutrition, contributing to severe outcomes (Mylonakis et al., 2022)

Conclusion

- Influenza affects different age groups in Kenya, but children under 5 years were the majority

- Nakuru and Kakamega county referral hospitals had high incidence rates

Recommendations

- Recognizing risk factors and promoting vaccination is essential
- Prioritize vaccination for children and pregnant individuals
- Promote public awareness for safe practices around ARI cases
- Strengthen healthcare worker capacity
- Maintain ongoing surveillance

References

- Gachari, M. N., Ndegwa, L., Emukule, G. O., Kirui, L., Kalani, R., Juma, B., Mayieka, L., Kinuthia, P., Widdowson, M. A., & Chaves, S. S. (2022). Severe acute respiratory illness surveillance for influenza in Kenya: Patient characteristics and lessons learnt. *Influenza and Other Respiratory Viruses*, *16*(4), 740–748. https://doi.org/10.1111/irv.12979
- Matheka, D. M., Mokaya, J., & Maritim, M. (2013). Overview Of Influenza Virus Infections In Kenya: Past, Present And Future. *Pan African Medical Journal*, *14*. https://doi.org/10.11604/PAMJ.2013.14.138.2612
- Thompson, W. W., Weintraub, E., Dhankhar, P., Cheng, P. Y., Brammer, L., Meltzer, M. I. M. I., Bresee, J. S., & Shay, D. K. (2009). Estimates of US influenza-associated deaths made using four different methods. *Influenza and Other Respiratory Viruses*, *3*(1), 37–49. https://doi.org/10.1111/J.1750-2659.2009.00073.X
- Cheng, W., Yu, Z., Liu, S., Zhang, X., Wang, X., Cai, J., Ling, F., & Chen, E. (2017). Comparison of influenza epidemiological and virological characteristics between outpatients and inpatients in Zhejiang Province, China, March 2011–June 2015. *International Journal of Environmental Research and Public Health*, *14*(2). https://doi.org/10.3390/ijerph14020217
- Hasan, S., Iqbal, M., Webby, R. J., Debeauchamp, J., Rashid, H. Bin, Ahmad, M. U. D., Nazir, J., Sadiq, S., Khan, A. W., & Chaudhry, M. (2021). Risk Factors of Influenza-Associated Respiratory Illnesses Reported to a Sentinel Hospital of Lahore, Pakistan: 2015-2016. *Canadian Journal of Infectious Diseases and Medical Microbiology*, *2021*, 1–8. https://doi.org/10.1155/2021/2460553
- Mylonakis, S. C., Mylona, E. K., Kalligeros, M., Shehadeh, F., Chan, P. A., & Mylonakis, E. (2022). How Comorbidities Affect Hospitalization from Influenza in the Pediatric Population. *International Journal of Environmental Research and Public Health*, *19*(5). https://doi.org/10.3390/ijerph19052811

Thank you!