Zoonotic Spillover – Part 1

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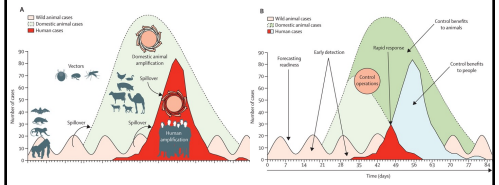
What are you going to hear about today?

1. The ecology of zoonoses and spillover
2. What is disease spillover?
3. What factors are associated with disease spillover events?
4. Considerations for modelling spillover

2

The ecology of zoonoses



Kaneshi et al. 2012

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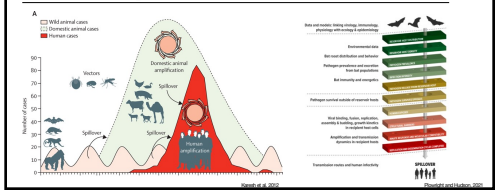
How much do you think you know about spillover?

A spillover pop quiz

4

What factors are associated with disease spillover events?



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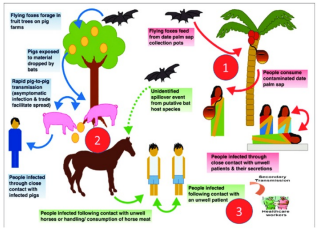

Schematic representation of three modes of Nipah virus spread: (1) bat-to-human, (2) animal-to-human, and (3)human-tohuman (including nosocomial)

Chattu et al. 2018

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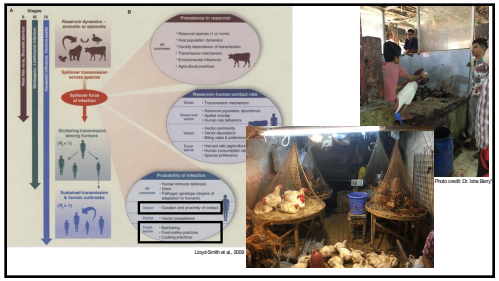

Photo credit: Dr. Isha Berry

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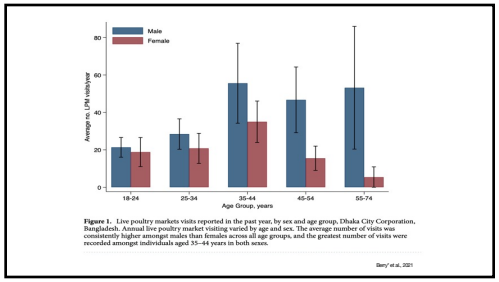

Figure 1. Live poultry markets visits reported in the past year, by sex and age group, Dhaka City Corporation, Bangladesh. Annual live poultry market visiting varied by age and sex. The average number of visits was consistently higher amongst males than females across all age groups, and the greatest number of visits were recorded amongst individuals aged 35–44 years in both sexes.

Barry* et al., 2021

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	Male	Female	All	
	% (95% CI)	% (95% CI)	% (95% CI)	p-value[a]
Weighted sample[b]	n = 406	n = 359	n = 765	–
Washed hands with soap				<0.001 ★
Always			1.6 (–79.2)	
Not always			1.5 (–23.7)	
Never			–6.7)	
Wore gloves[c]				0.220
Always			–3.9)	
Not always			– 3.1)	
Never			1.1 (–97.4)	
Wore facemask				0.002 ★
Always			–4.1)	
Not always			–9.8)	
Never			7.4 (–92.2)	
Wore apron[c]				0.182
Always			– 1.2)	
Not always	0.0	1.2 (0.5–2.8)	0.7 (0.3–1.7)	
Never	99.6 (96.9–99.9)	98.5 (96.8–99.3)	98.9 (97.8–99.4)	

Table 3. Uptake of protective practices among those with poultry exposure in the past year, by sex, Dhaka City Corporation, Bangladesh. *CI* confidence interval. [a]P-value obtained from chi-square test comparing males and females. [b]Sample weighted by age, sex and education to the Dhaka City Corporation demographic profile of the 2011 Bangladesh census. Weighted denominator is those who report any exposure to live poultry in the past year. [c]Question was only asked to those who report slaughtering, defeathering, eviscerating and/or cutting poultry; weighted denominator includes only those who report these exposures, n = 566.

Barry[a] et al., 2021

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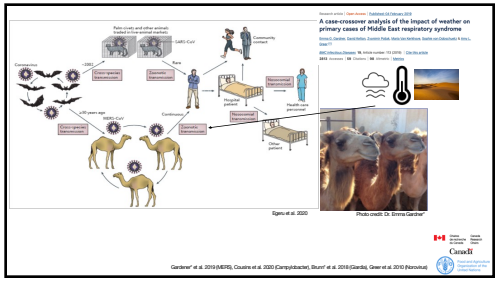

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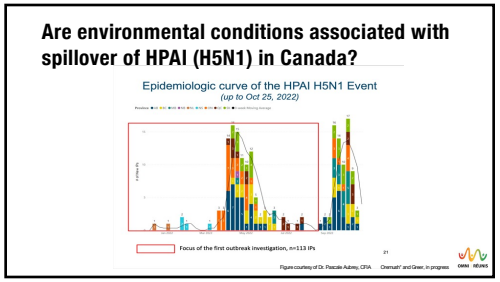

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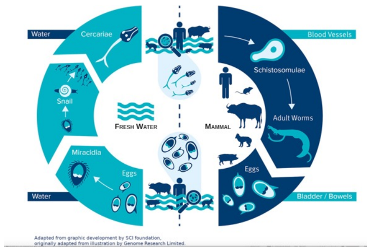

Janouskova et al. 2022

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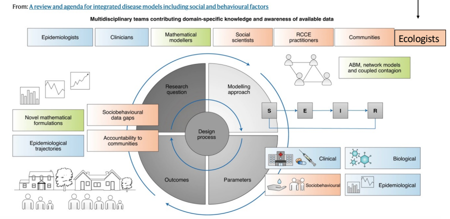
Fig. 1: An approach to more integrated modelling.

From: A review and agenda for integrated disease models including social and behavioural factors



Bedson et al. 2021

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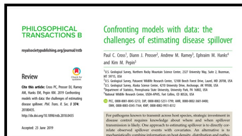

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Review

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Confronting models with data: the challenges of estimating disease spillover

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For pathogens known to transmit across host species, strategic investment in disease control requires knowledge about where and when spillover transmission is likely. One approach to estimating spillover is to directly correlate observed spillover events with covariates. An alternative is to mechanistically combine information on host density, distribution and patho-

Form groups of 4 to have some initial discussion of the paper (be prepared to share your discussion points with the class):

1. In your group, summarize the main points made by the authors of the paper. What is the key message of this paper as it relates to disease spillover?
2. What is one aspect of the paper that you found particularly interesting or that was something you had never previously considered?
3. Draft 2 questions that you have about the paper that someone else in the class might be able to comment on.

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