

# **BSc Global Health**

## **Tuberculosis in the United Kingdom: migration and control**

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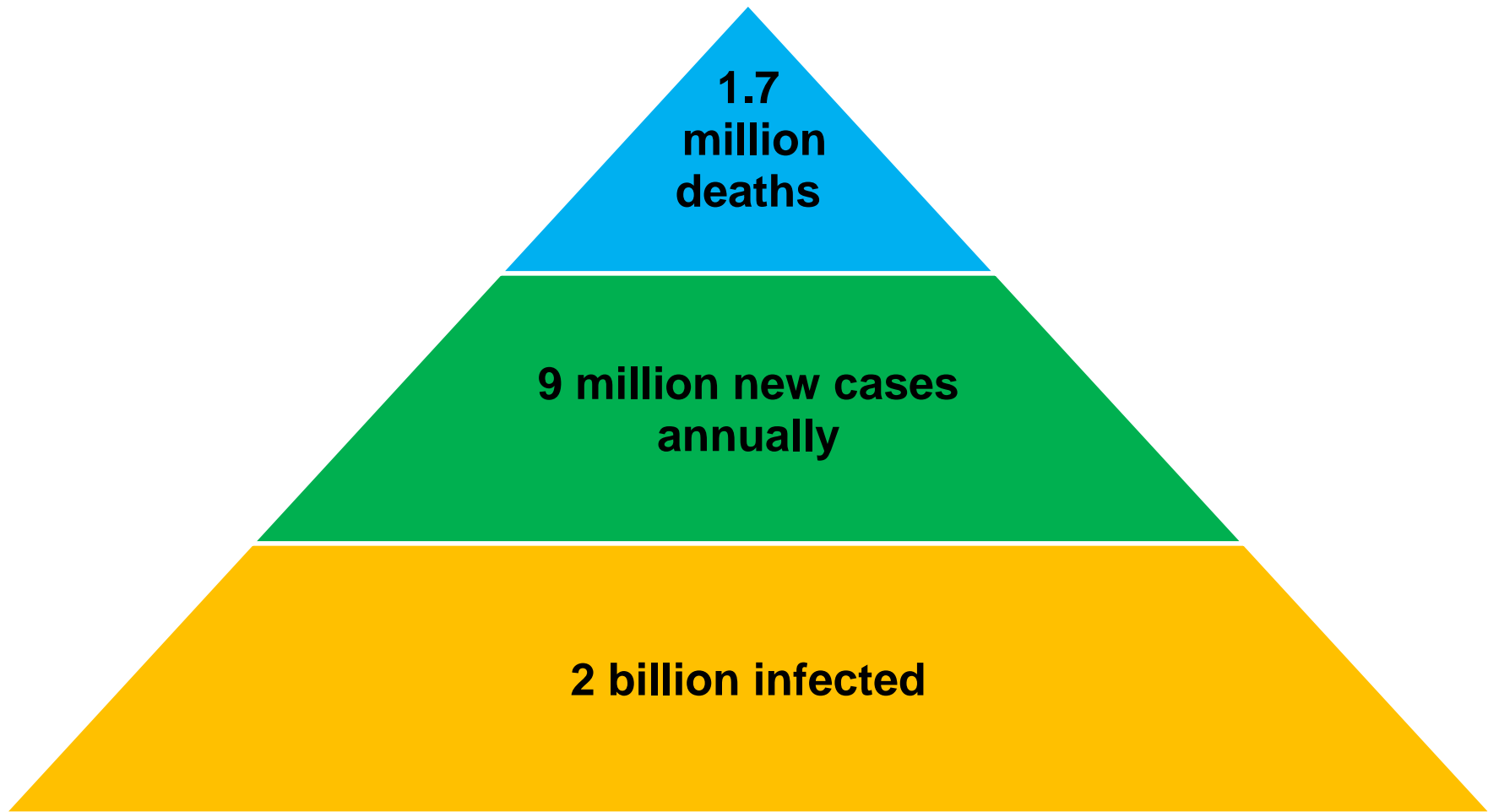
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Clinical Research Fellow  
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# Areas to cover today...

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- **Epidemiology of TB – globally and locally**
- **Factors driving TB burden in the UK**
- **Methods of TB control in migrants**
  - **Current systems in place**
  - **Future directions**
- **Concluding statements**

# TB: global health emergency

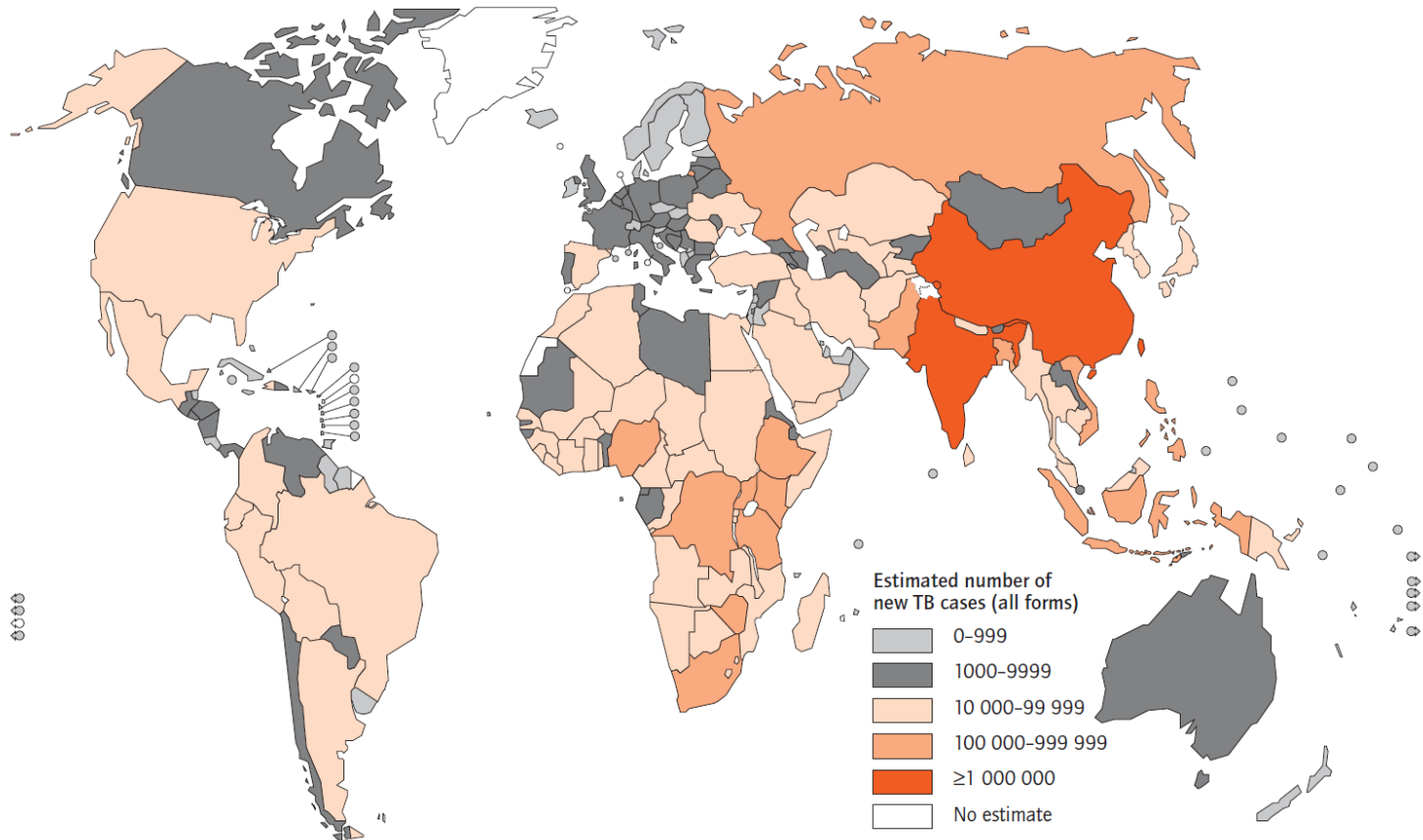


**Latently infected versus active disease**

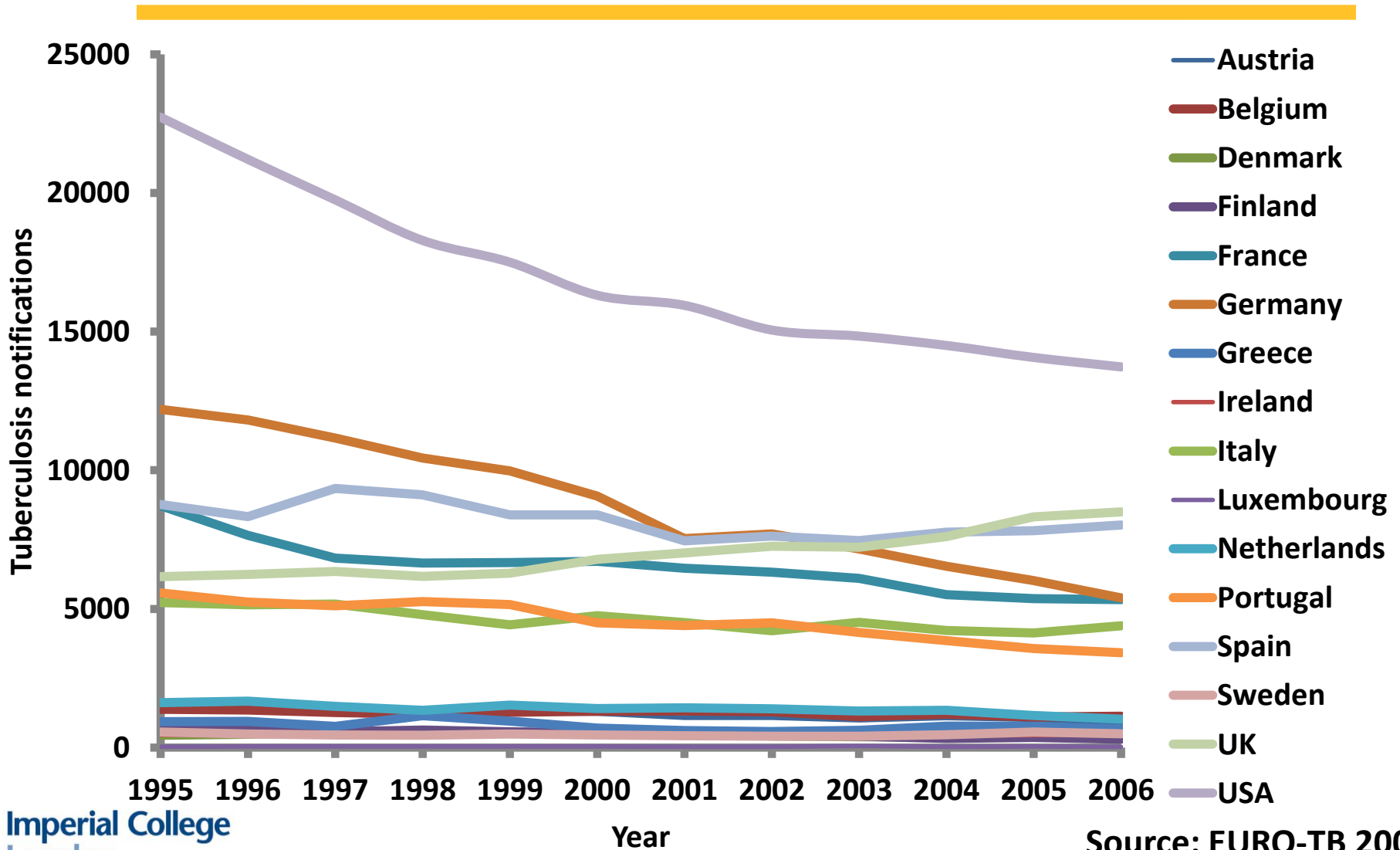
# 22 high burden countries account for over 80% of cases

■ **FIGURE 1.1**

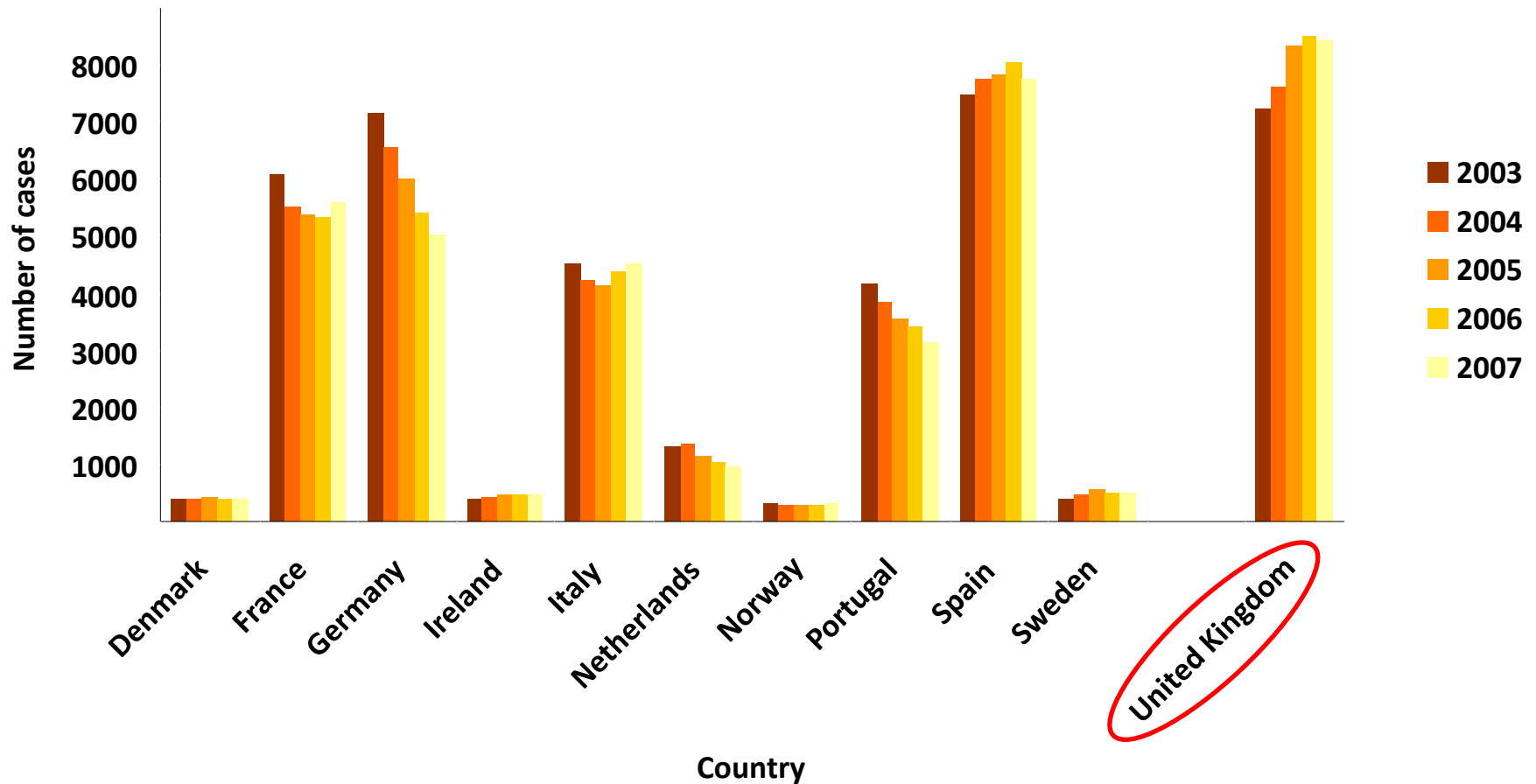
Estimated number of new TB cases, by country, 2007



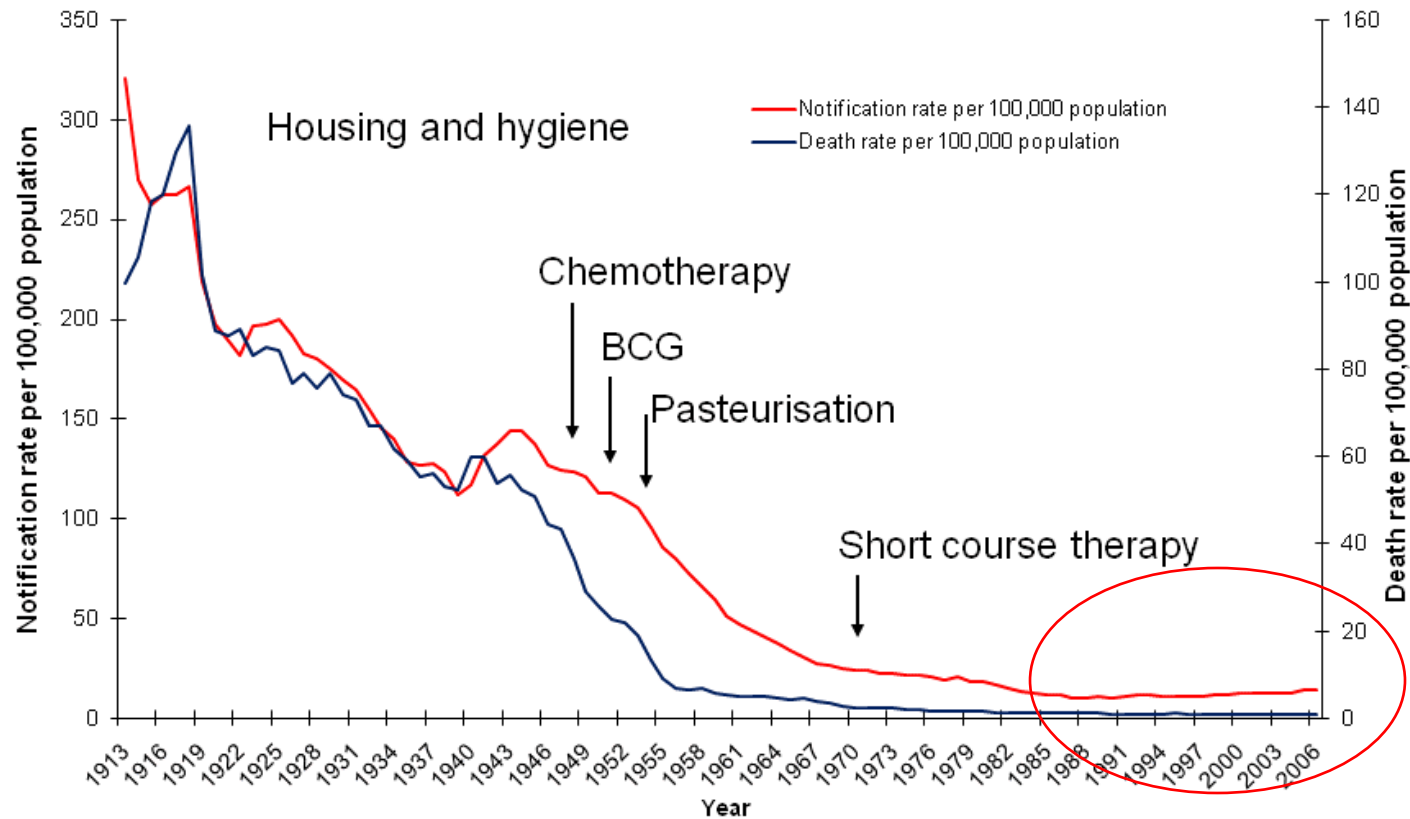
# TB remains a problem in the developed world



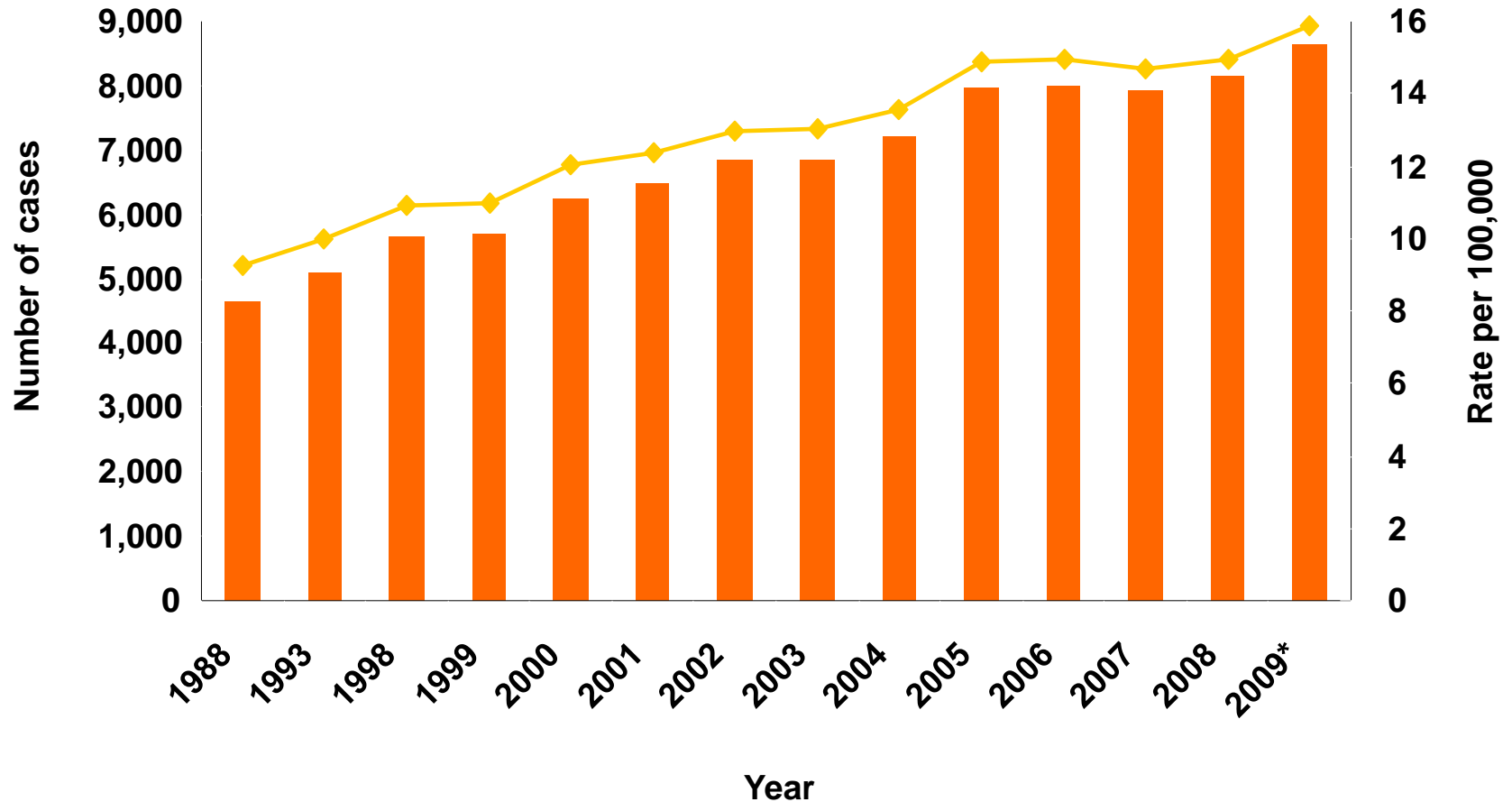
# UK: highest number of TB cases in Western Europe



# Developed world TB: UK as an example



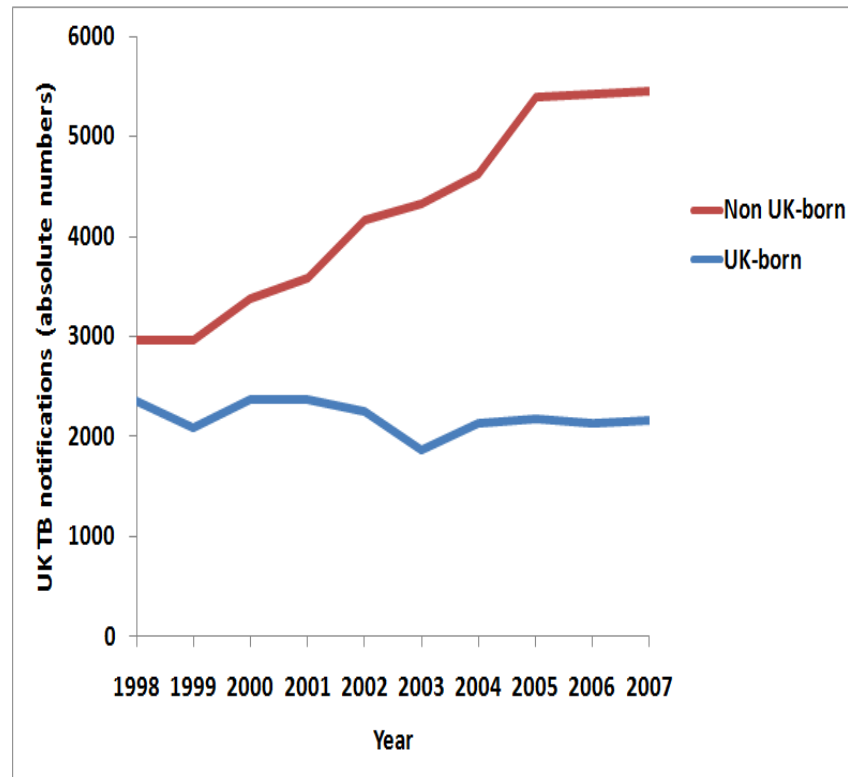
# TB incidence in the UK is increasing...



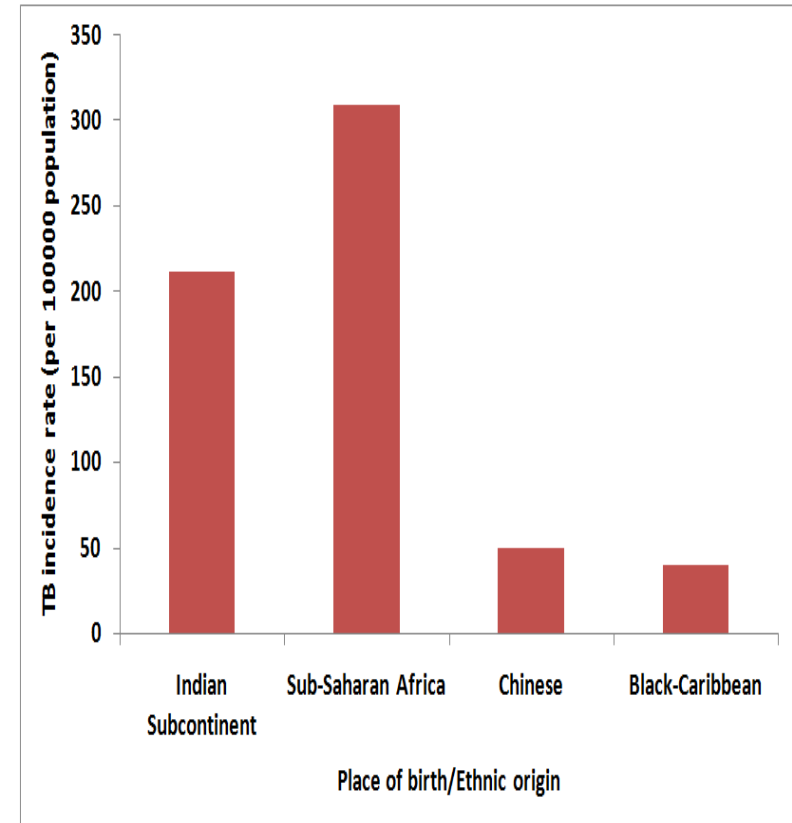
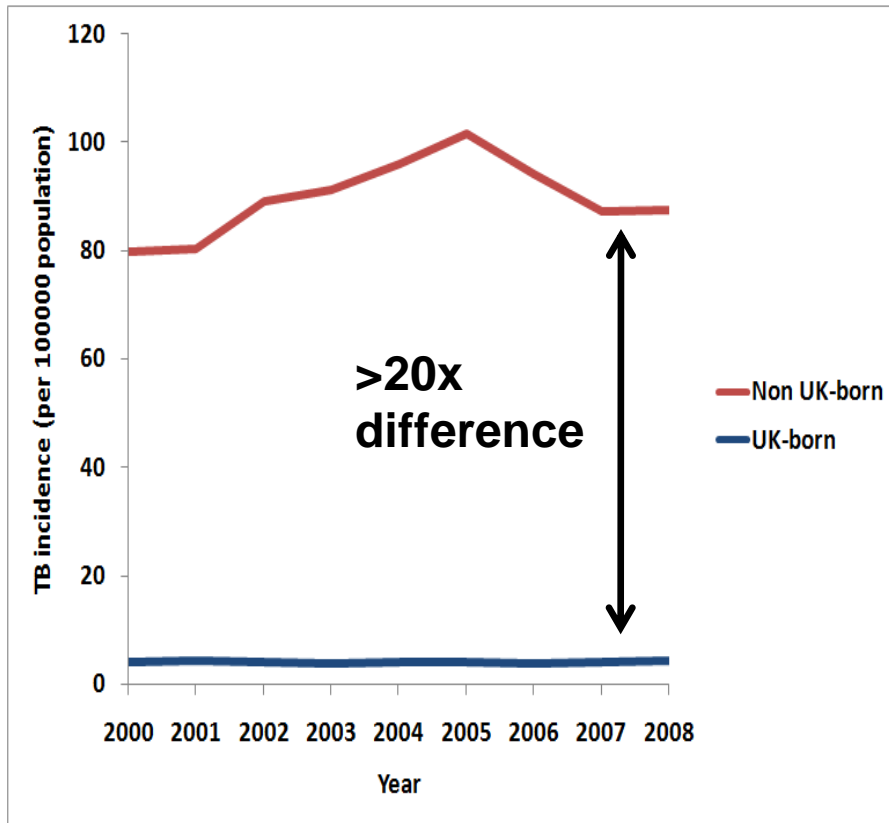


# ...but mainly in the foreign-born population

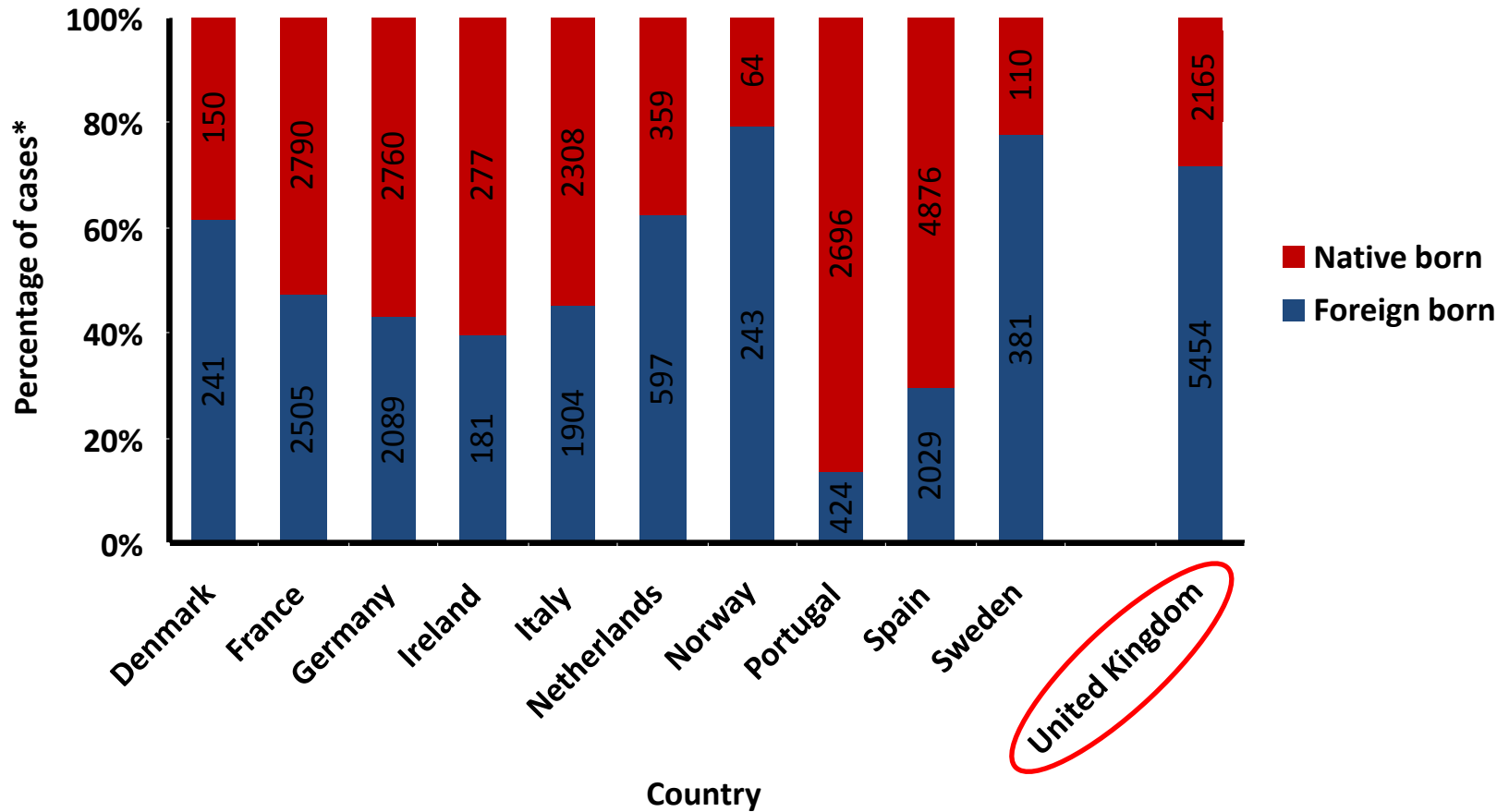
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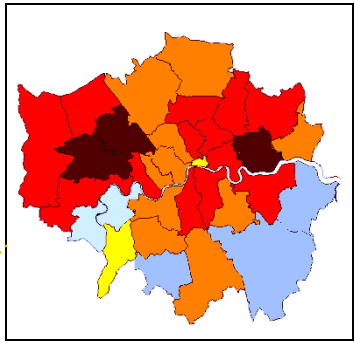
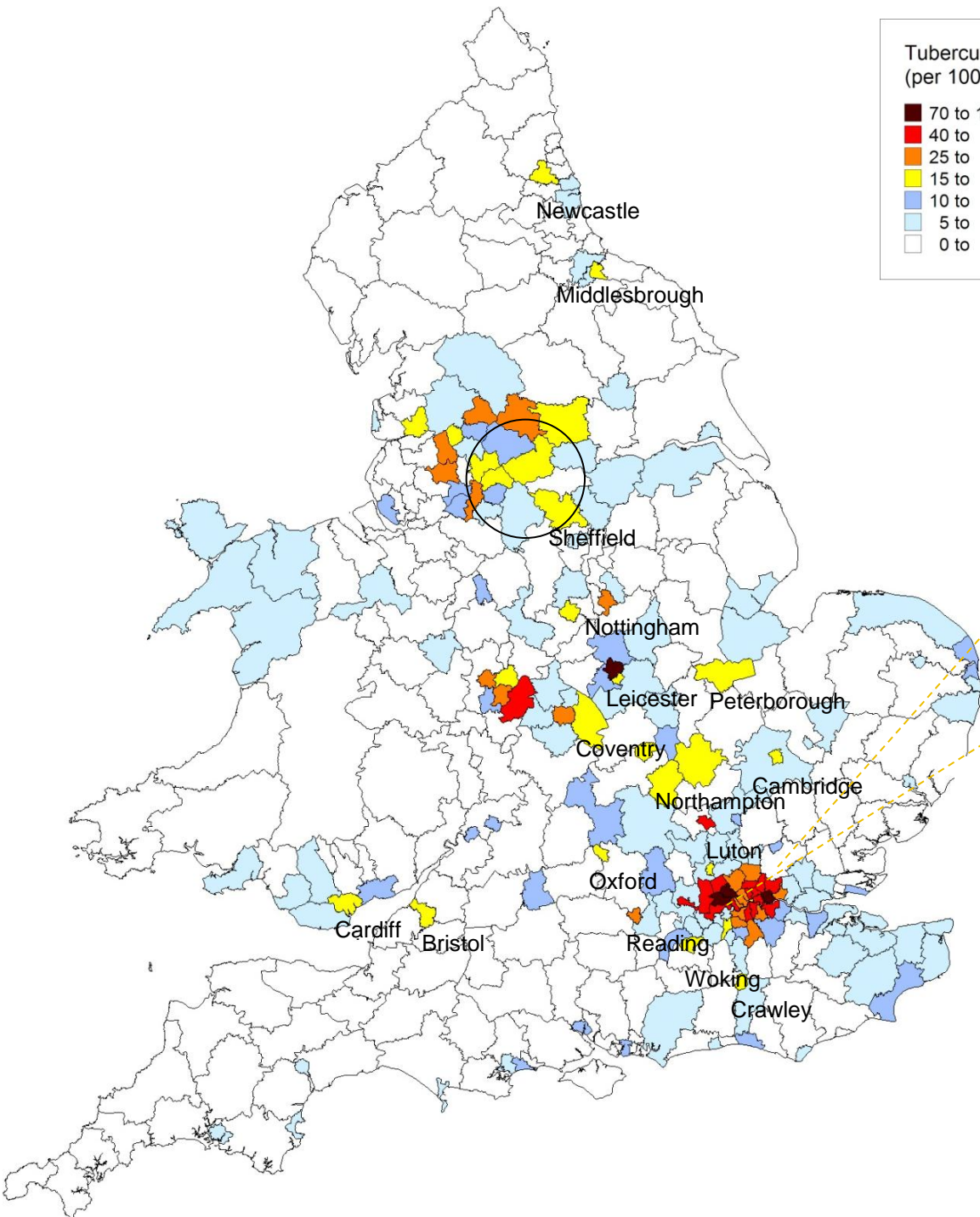
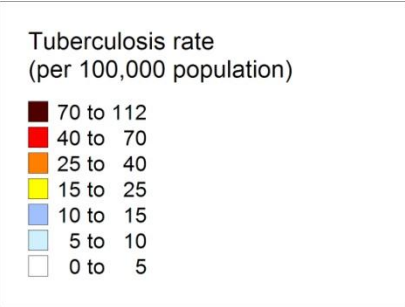


# TB mainly a disease of foreign-born in the UK



# Foreign-born TB is a significant proportion of the TB burden in developed countries





London high: 28 / 33 areas

- 3 areas > 70/ 100,000
- 13 areas ~ 40-70/ 100,000

Outside high: 38 / 315

- 1 area > 70/ 100,000
- 3 areas ~ 40-70/ 100,000

All high areas were urban

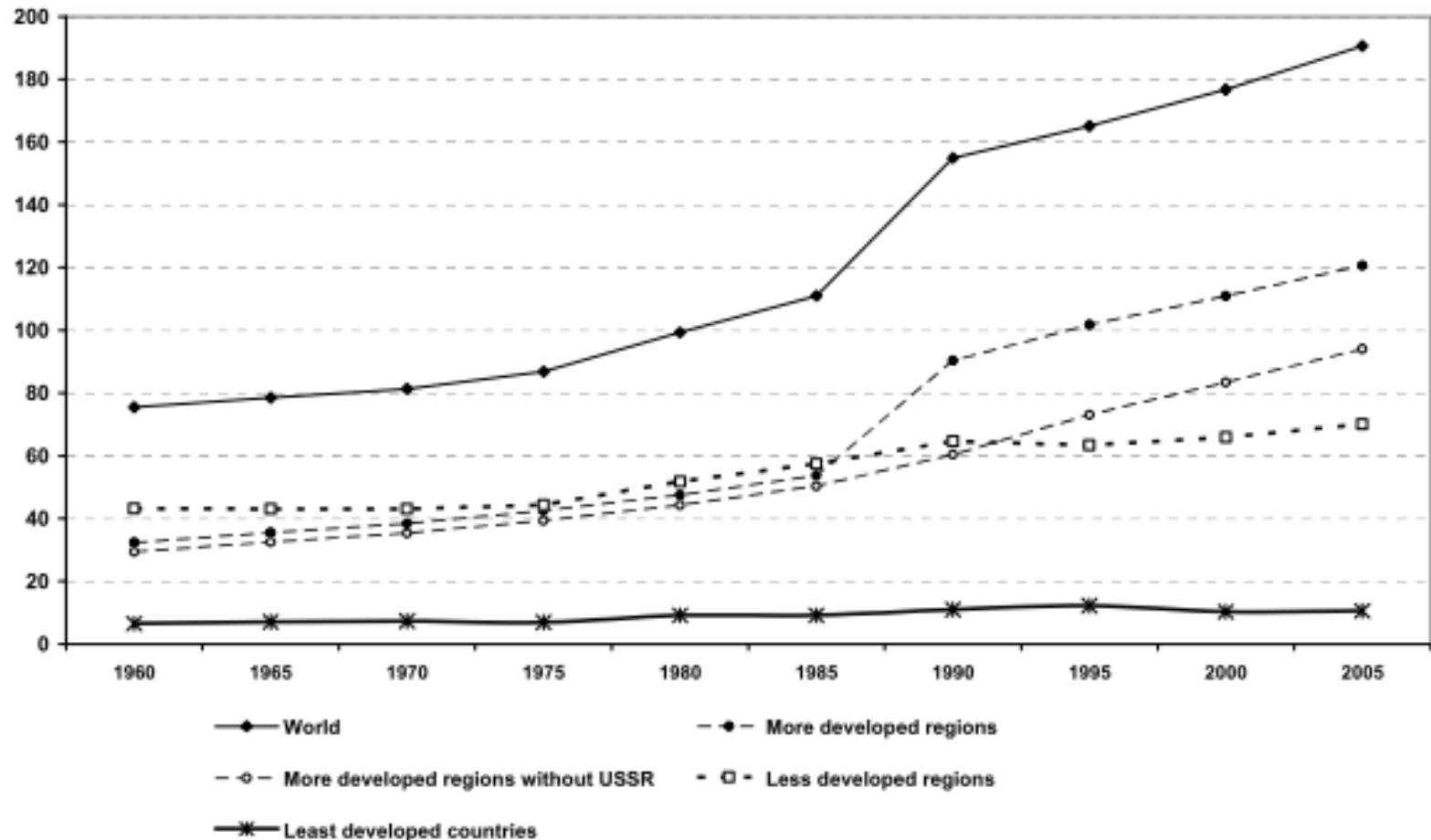
# But why?

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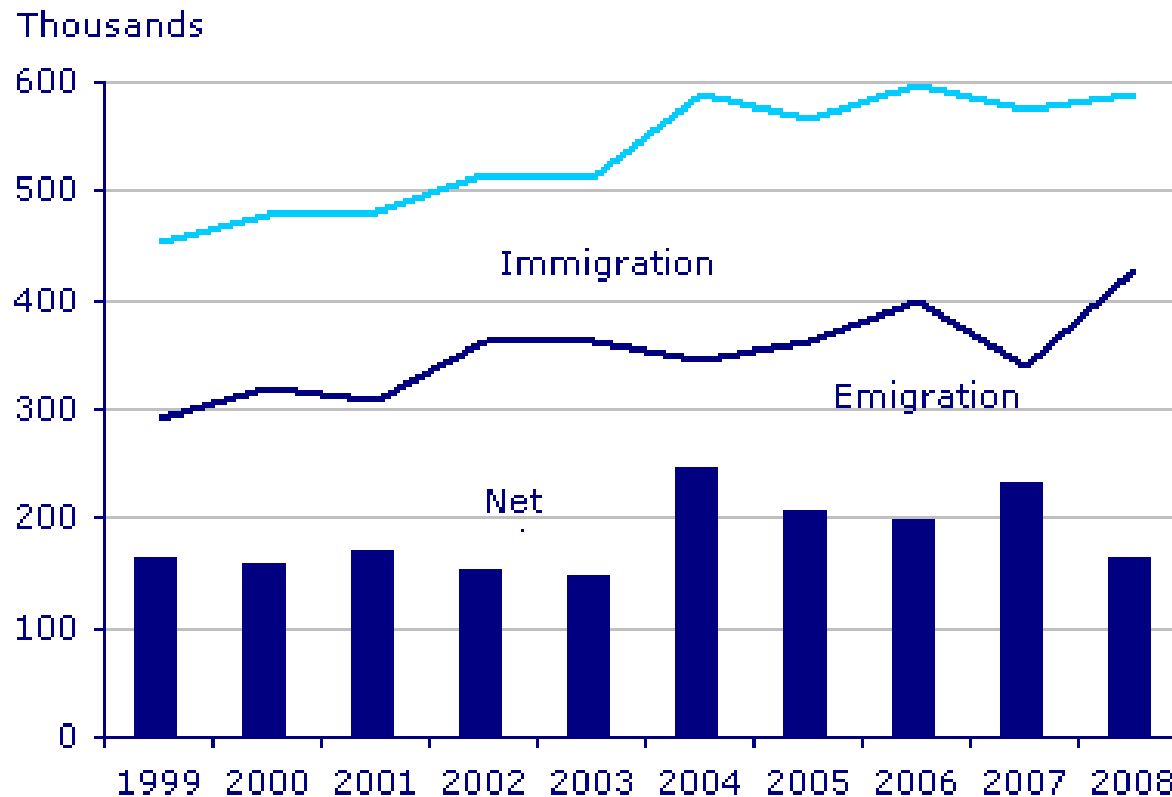


**Reason: Synergistic impact of migration and reactivating LTBI**

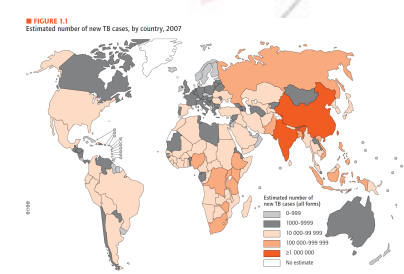
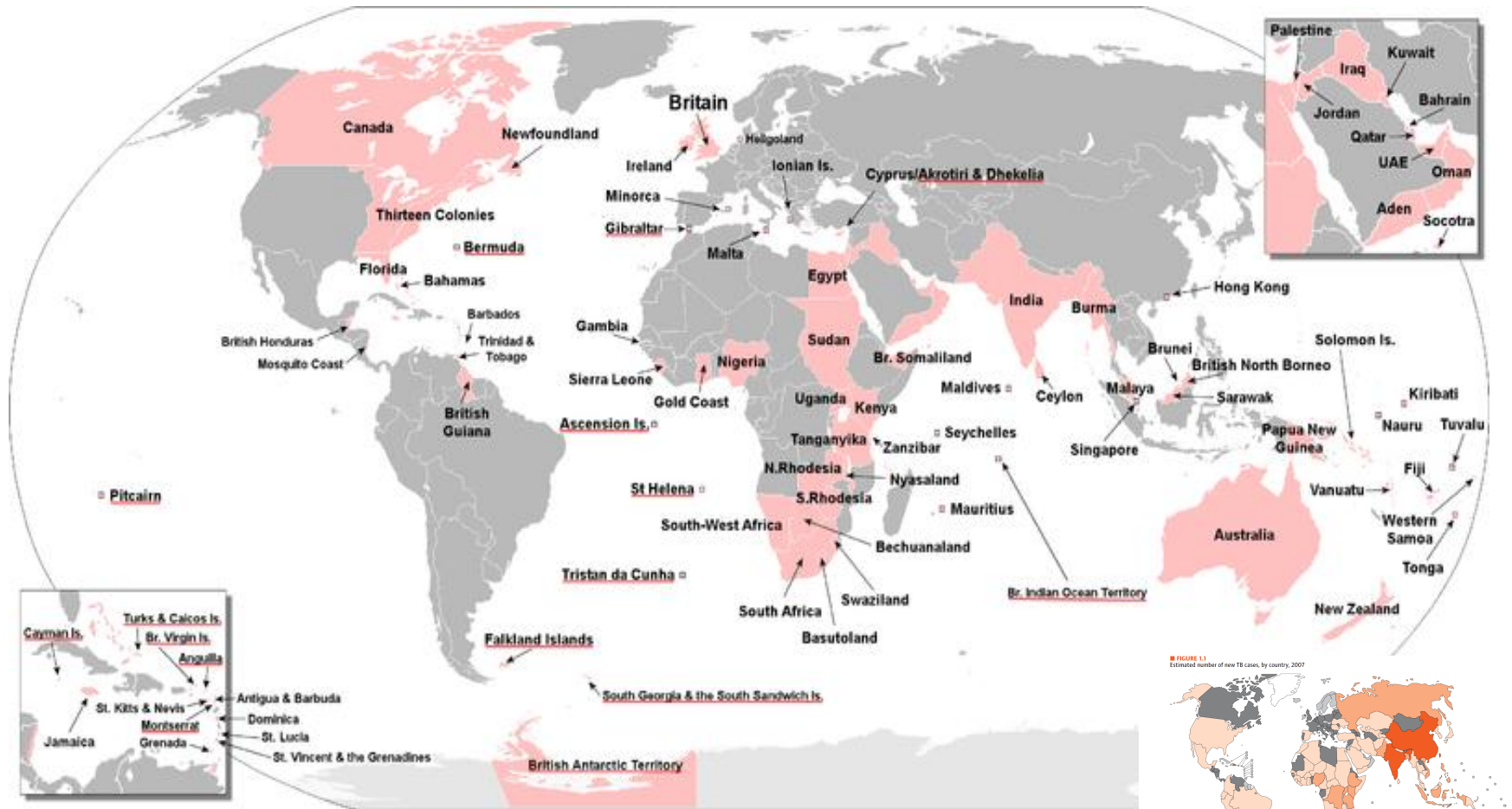
# Evolving migration patterns during the 20th/21st century



# Migration to the UK

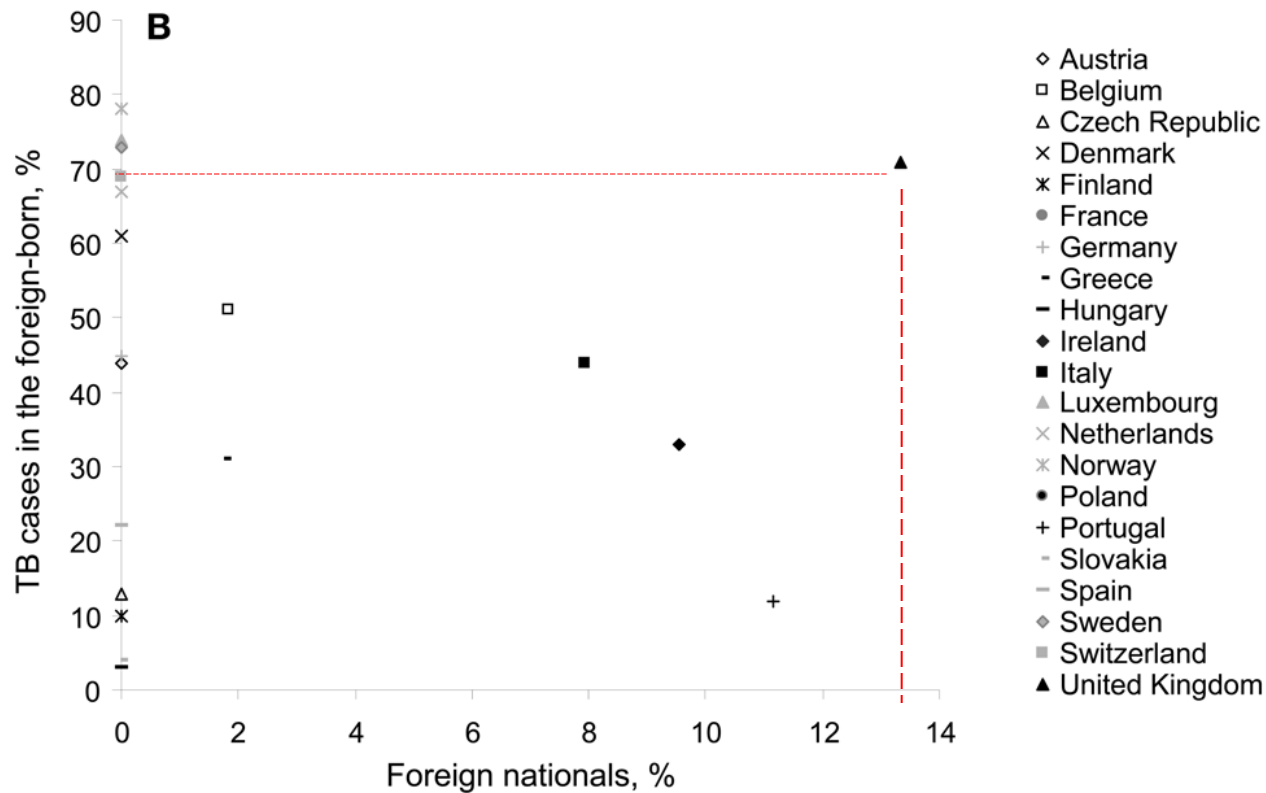


# Migration to UK influenced by its past





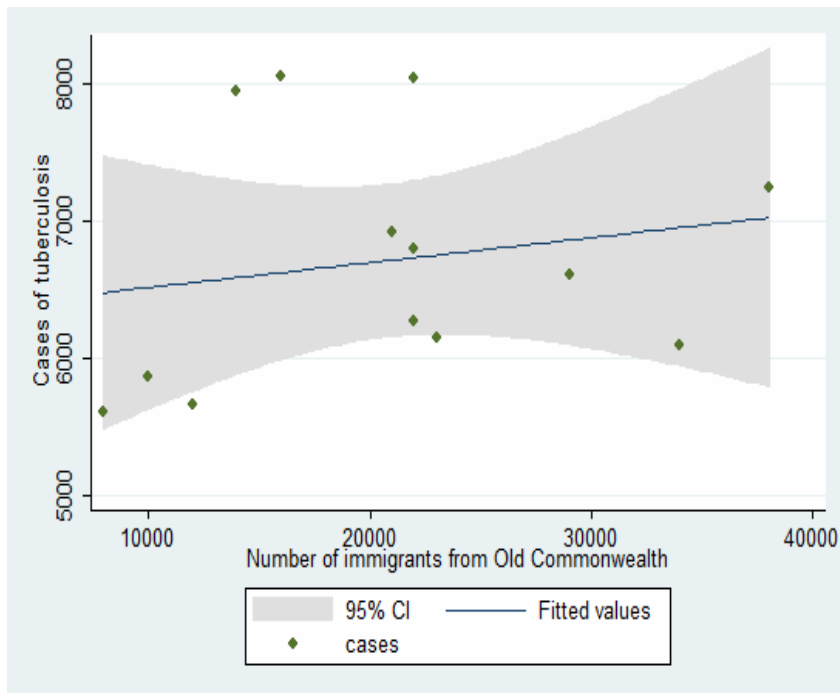
# Migrants to UK arrive from high incidence TB countries



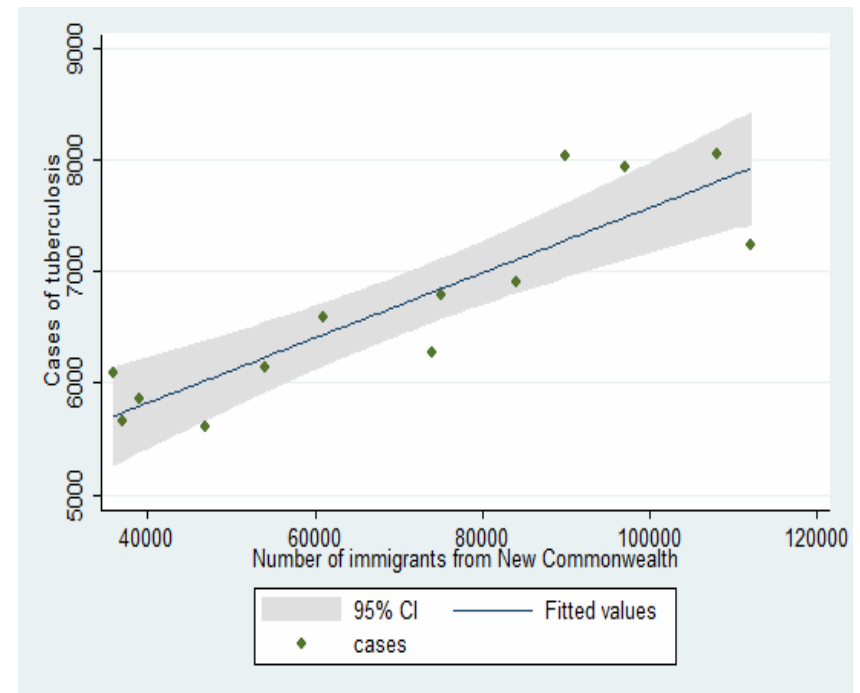
\* Comparison of the percentage of cases of TB in the foreign-born, with the percentage of migrants (from the 15 most frequently reported countries) from a country with a TB incidence of  $\geq 250/100\ 000$  in 2005 (2002 for Ireland and Poland).

# Relationship between migrant numbers and cases of TB in the UK

“Old” Commonwealth  
 $\rho=0.28$ ,  $p=0.34$

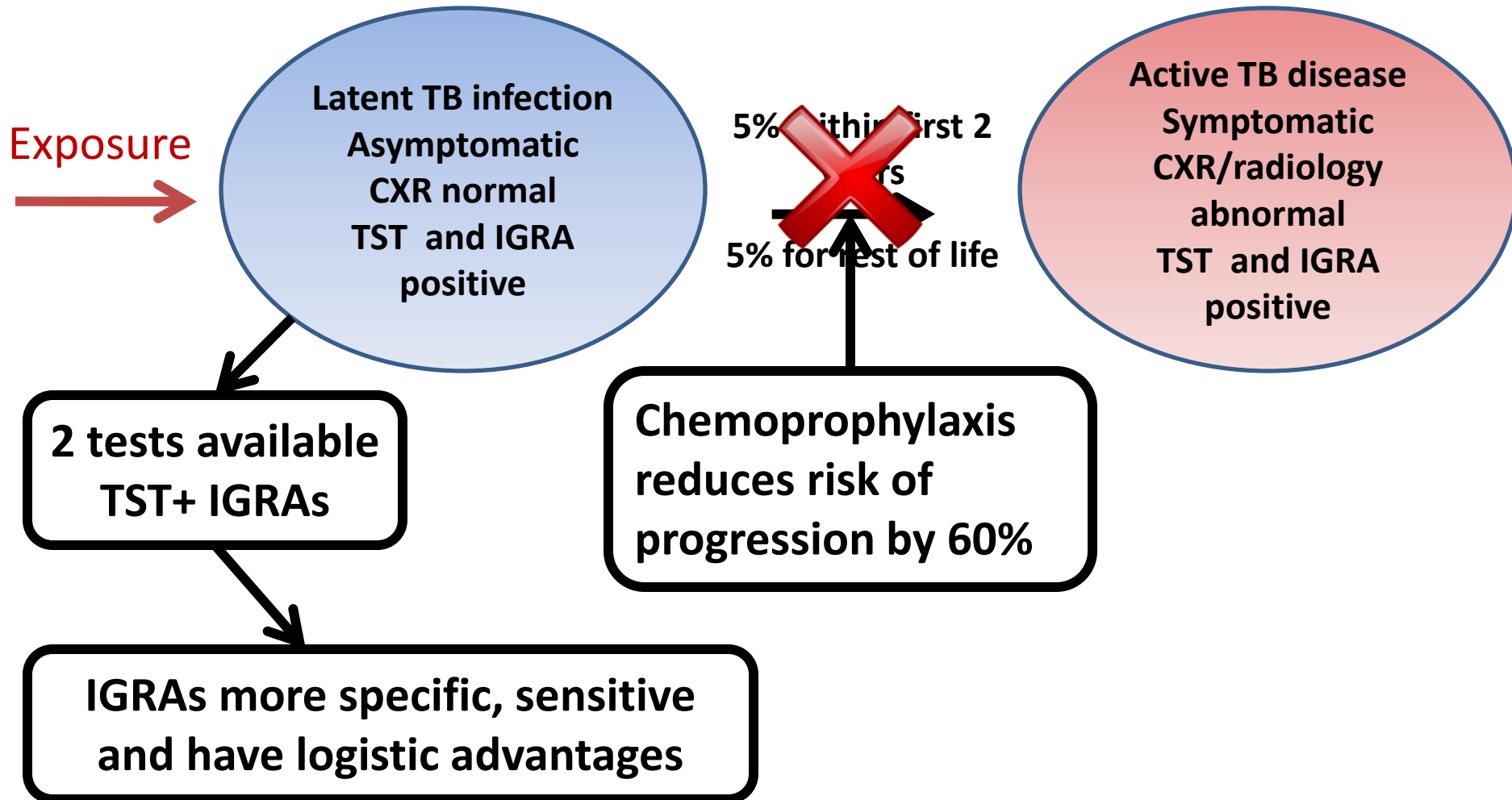


“New” Commonwealth  
 $\rho=0.91$ ,  $p<0.0001$



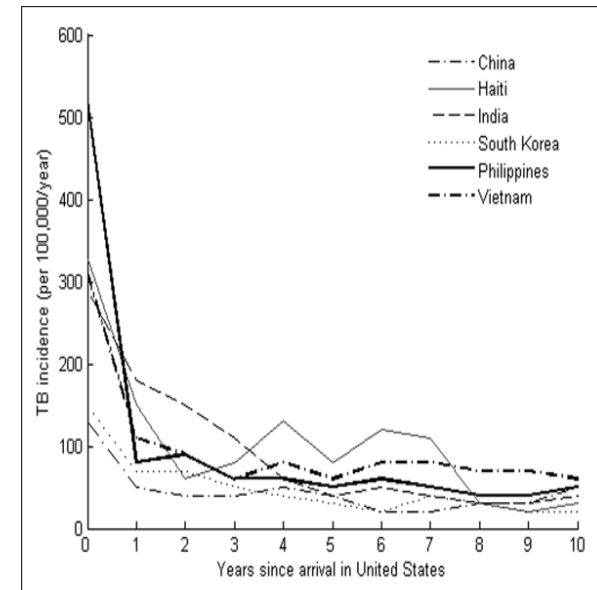
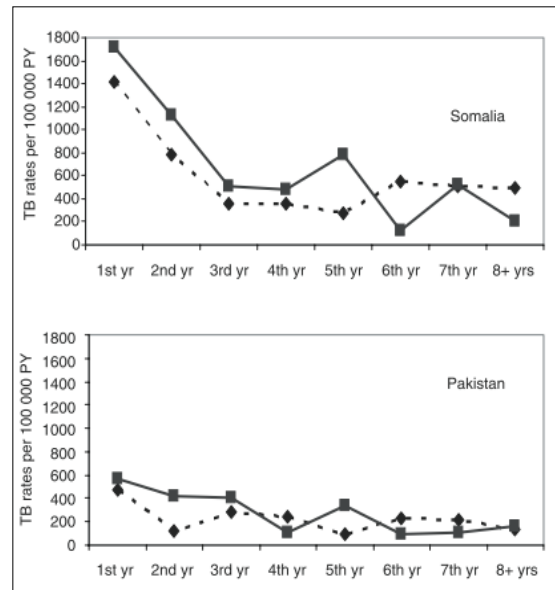
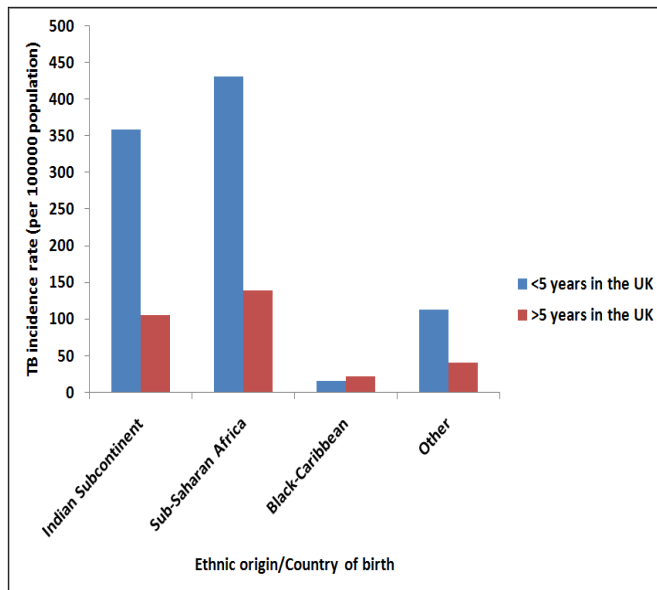
# Migration alone not enough...

## Need to consider TB natural history



# Reactivation of LTBI plays critical role

- Data suggests little active TB at time of migration
- High rates in initial years after migration (new-entrants)



**Molecular studies: limited community transmission**

# Limited community wide transmission

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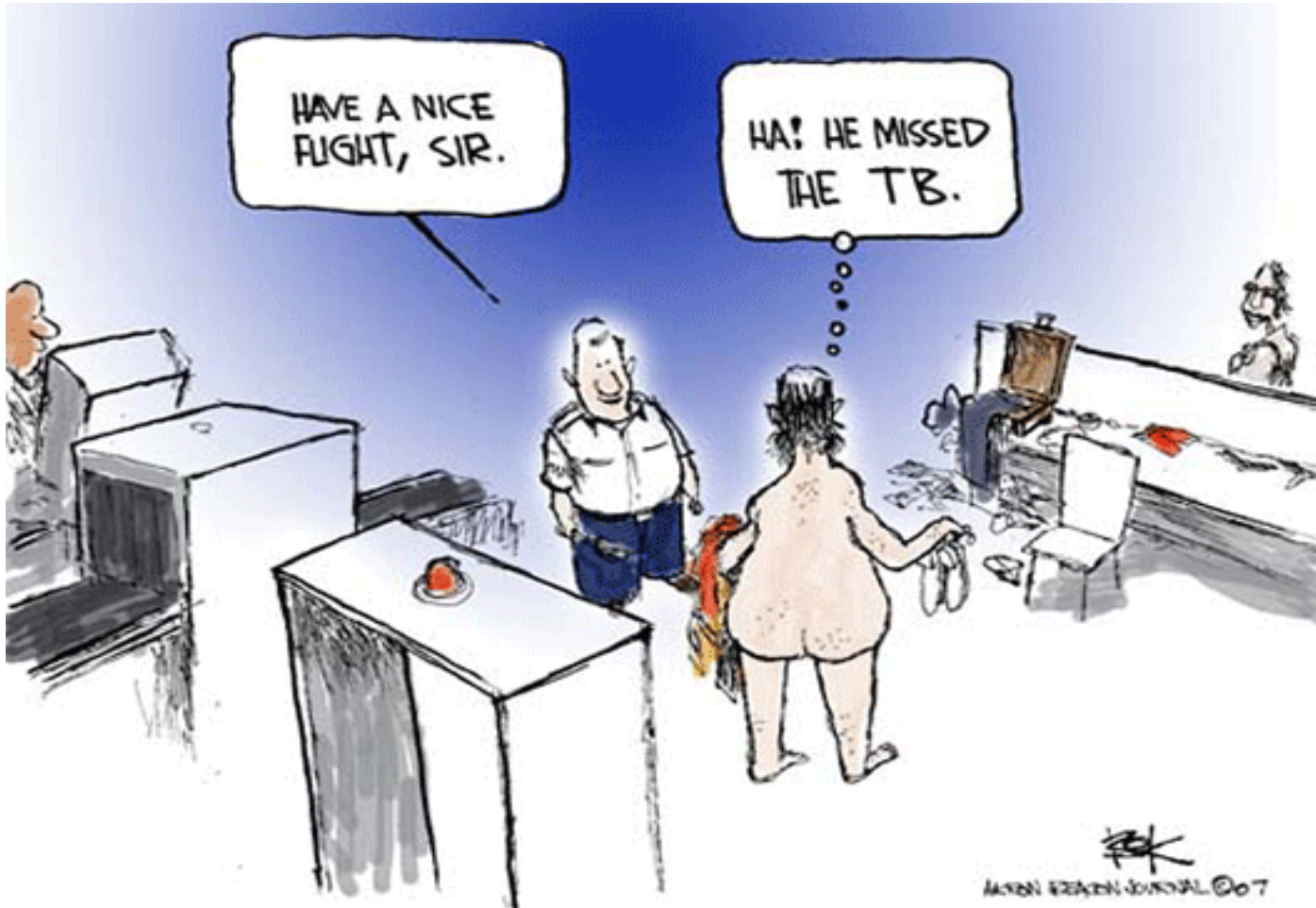
- **2 implications**
  - High rates in the foreign-born not due to transmission within migrant communities
  - Little/no transmission from migrant communities to UK born population

# To recap...

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- **TB in the UK primarily occurs in foreign-born**
- **Combined impact of migration and reactivation of pre-existing latent TB infection**
- **High rates within the first 5 years after entry (new-entrants)**
  
- **So how does the UK screen new-entrants?**

# Screening migrants arriving in the UK



# Screening immigrants arriving in the UK is organised around port of entry

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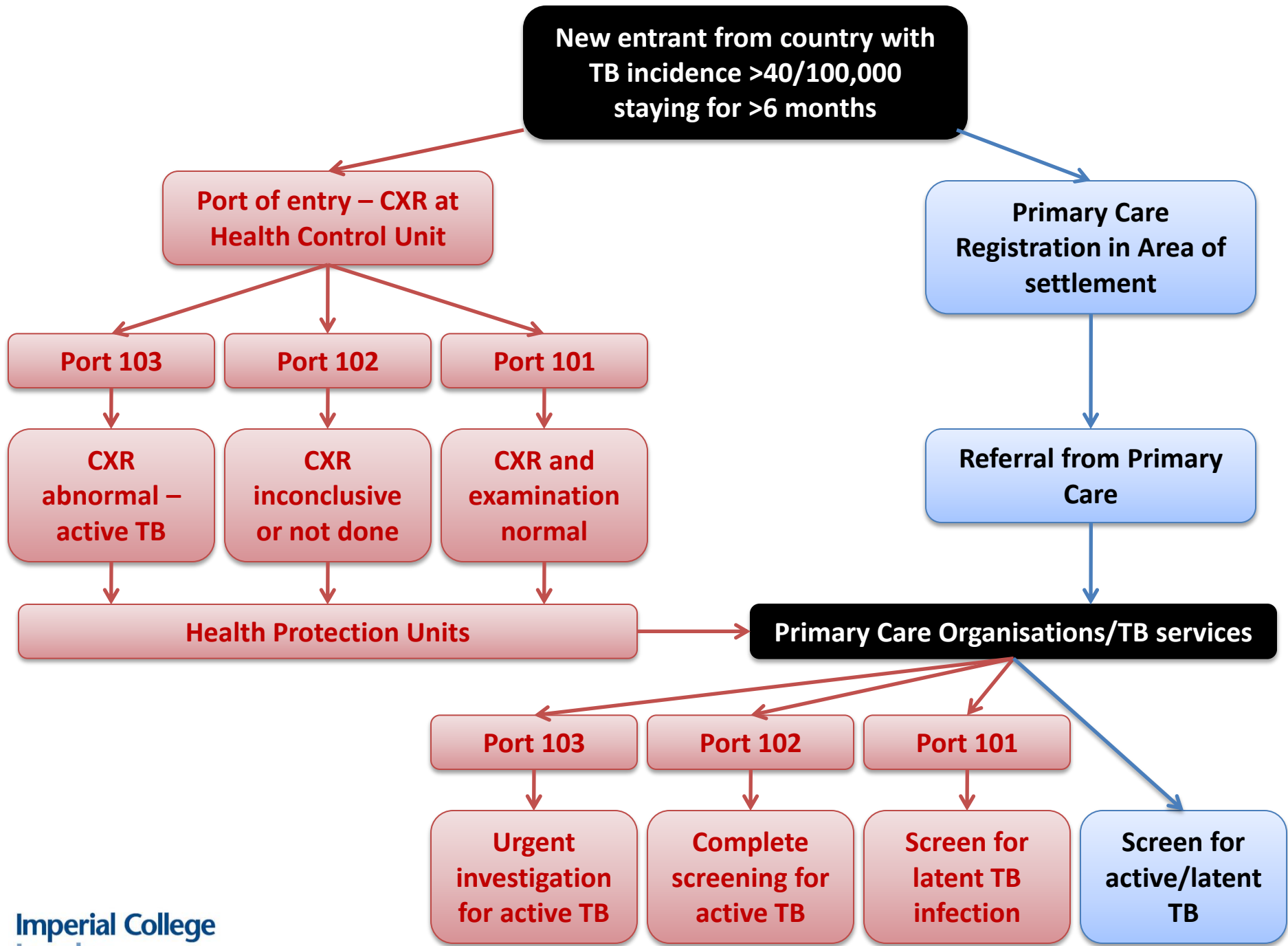
- Issue of national concern in 1950s/1960s
- Trial of CXR screening started in 1965 – Heathrow
  - Aim: identify active tuberculosis

Commonwealth Immigrants Act, 1962

Commonwealth Immigrants  
Act 1968

MEDICAL EXAMINATION UNDER THE  
IMMIGRATION ACT 1971





**New entrant from country with TB incidence >40/100,000 staying for >6 months**

**Port of entry – CXR at Health Control Unit**

**Port 103**

**Port 102**

**Port 101**

**CXR abnormal – active TB**

**CXR inconclusive or not done**

**CXR and examination normal**

**Health Protection Units**

Primary Care Registration in Area of settlement

Referral from Primary Care

**Primary Care Organisations/TB services**

**Port 103**

**Port 102**

**Port 101**

**Urgent investigation for active TB**

**Complete screening for active TB**

**Screen for latent TB infection**

Screen for active/latent TB

Inconsistency in identifying new-entrants for further screening by the Health Control Units

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Port 103

Port 102

Port 101

CXR abnormal – active TB

CXR inconclusive or not done

CXR and examination normal

Poor attendance at local TB services by new-entrants

Referral from Primary Care

Health Protection Units

Primary Care Organizations/TB services

Port 103

Port 102

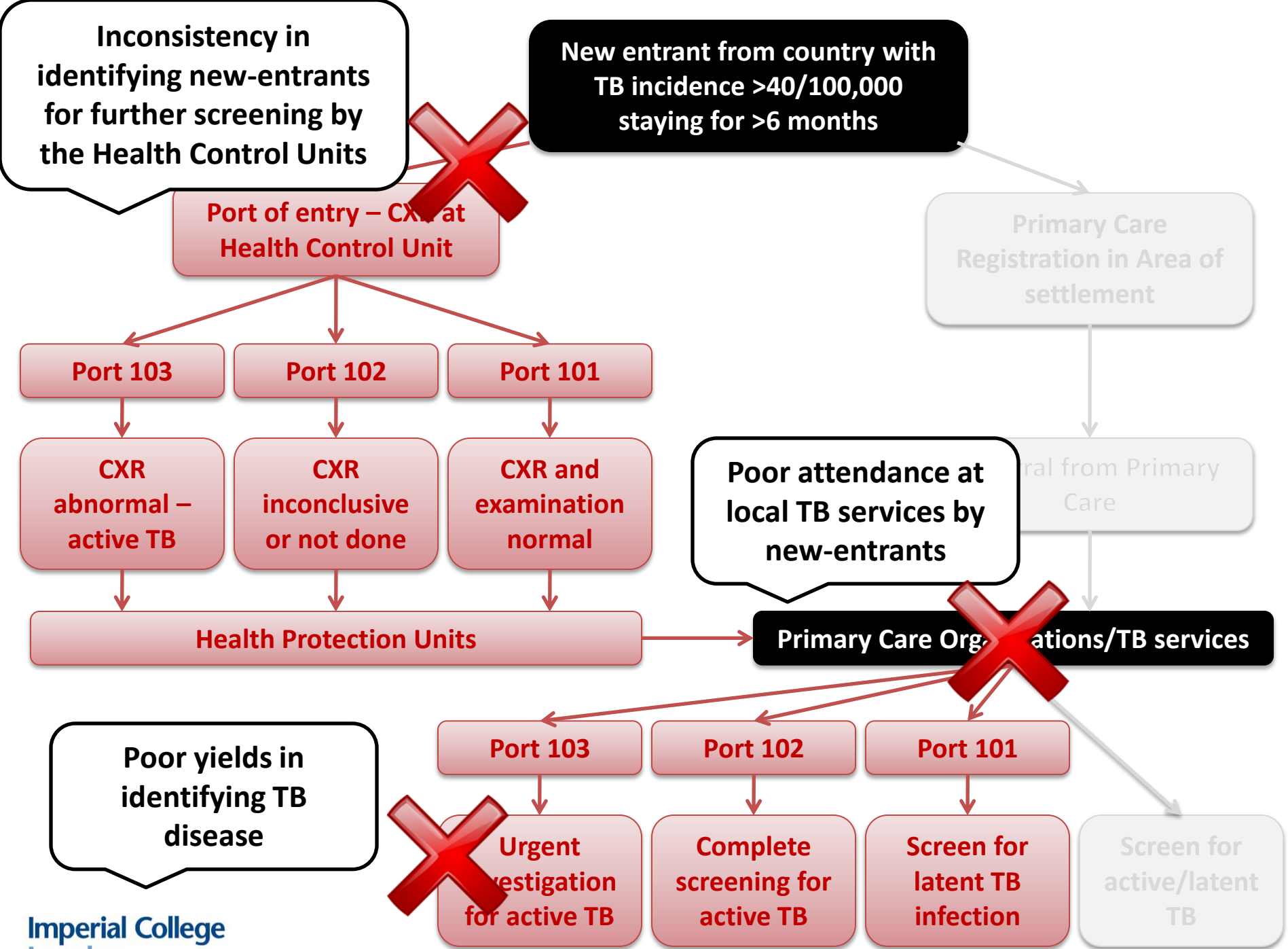
Port 101

Urgent investigation for active TB

Complete screening for active TB

Screen for latent TB infection

Screen for active/latent TB



# Port of entry screening has a low yield and is not cost-effective

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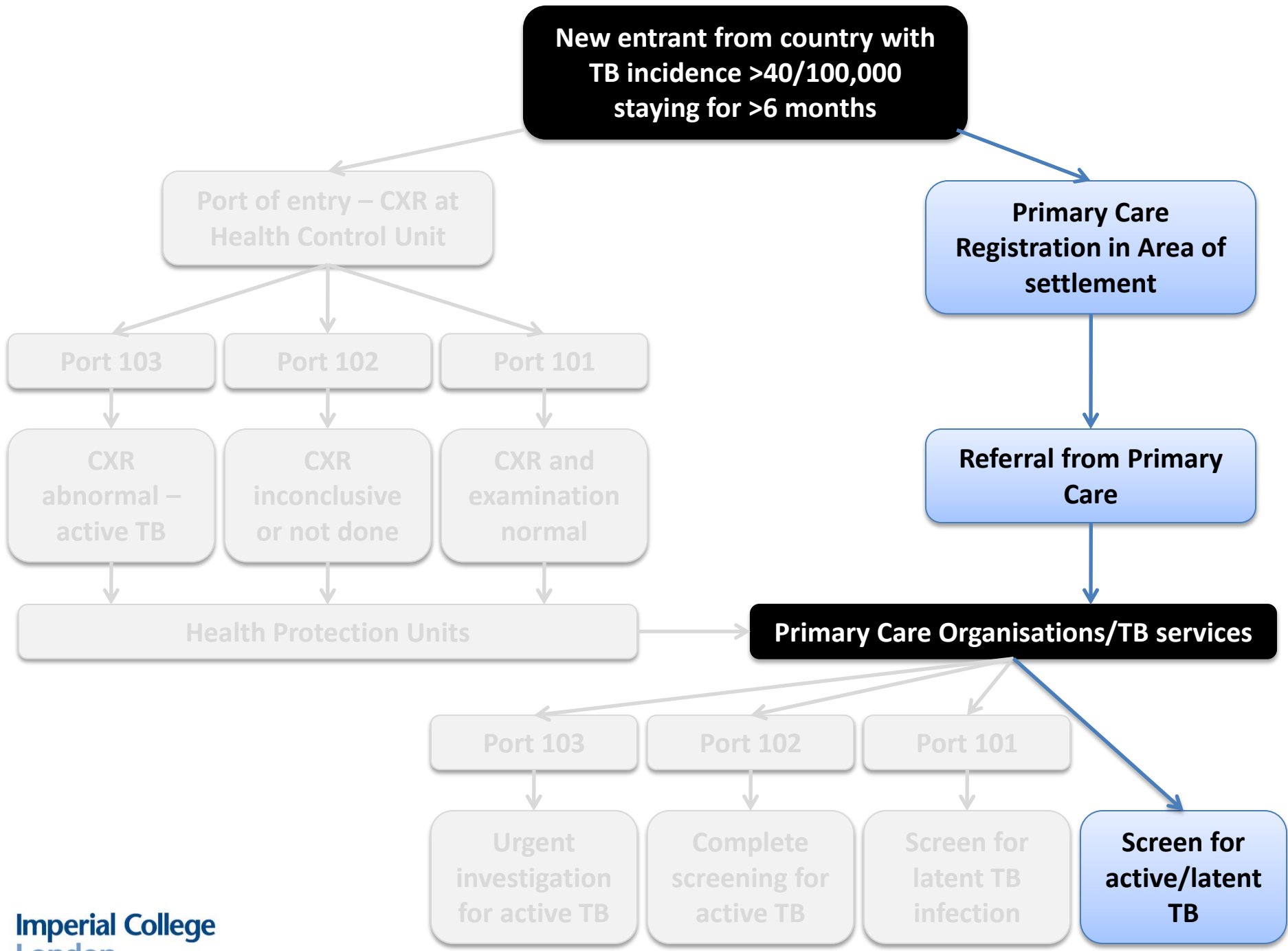
## Heathrow

- Total referrals 175,039
- Have X ray 71,000
- Abnormal 173
- TB diagnosed 92 (0.12%)

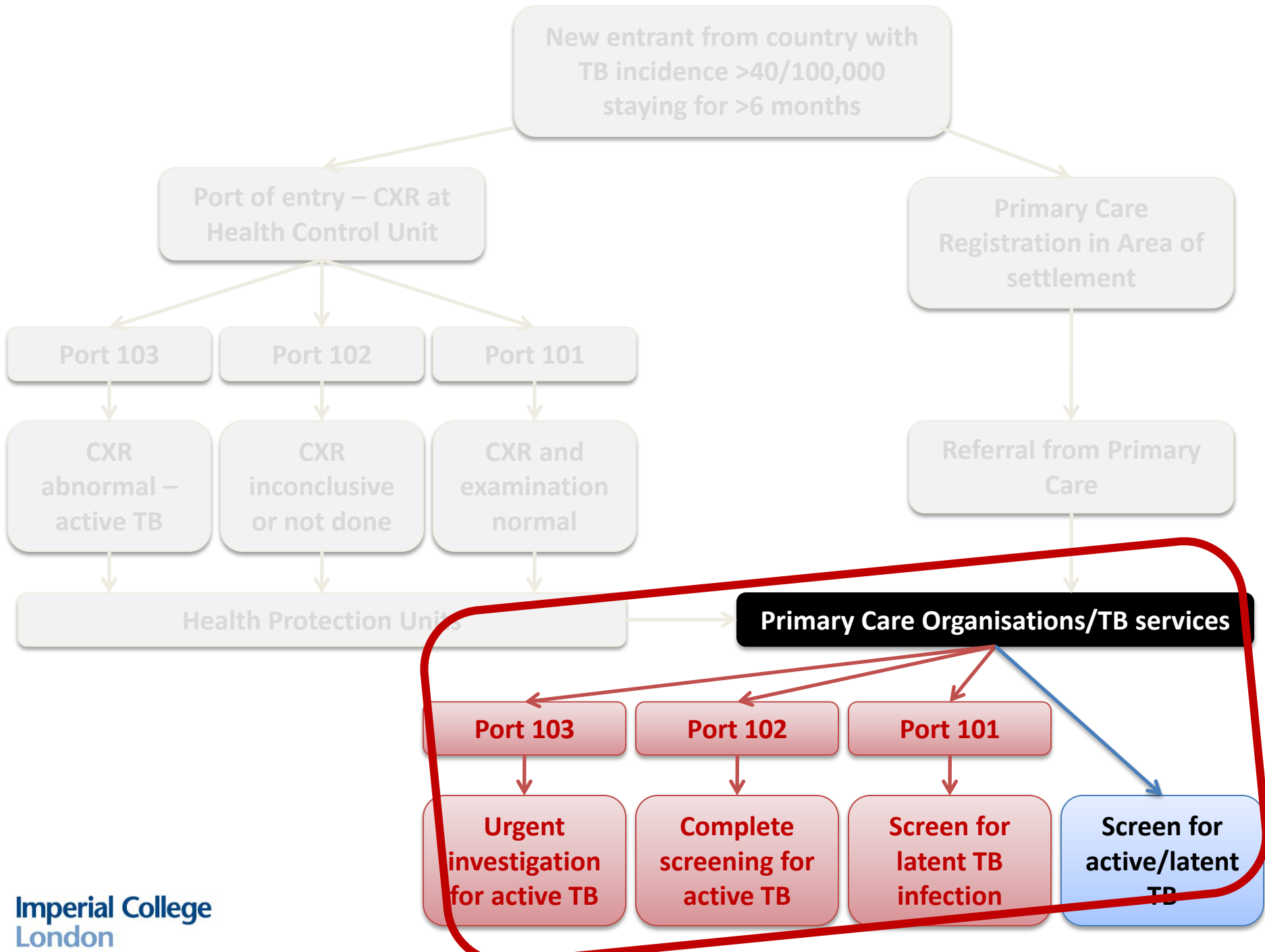
# UK now trialling pre-arrival TB screening in selected countries

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- **15 countries**
  - **Bangladesh, Cambodia, Ghana (takes applications from Burkina Faso, Cote d'Ivoire, Togo and Niger), Kenya (which also takes applications from residents of Eritrea and Somalia), Pakistan, Sudan, Tanzania and Thailand (which also takes applications from residence of Laos)**
  - **Aim: identify infectious tuberculosis**

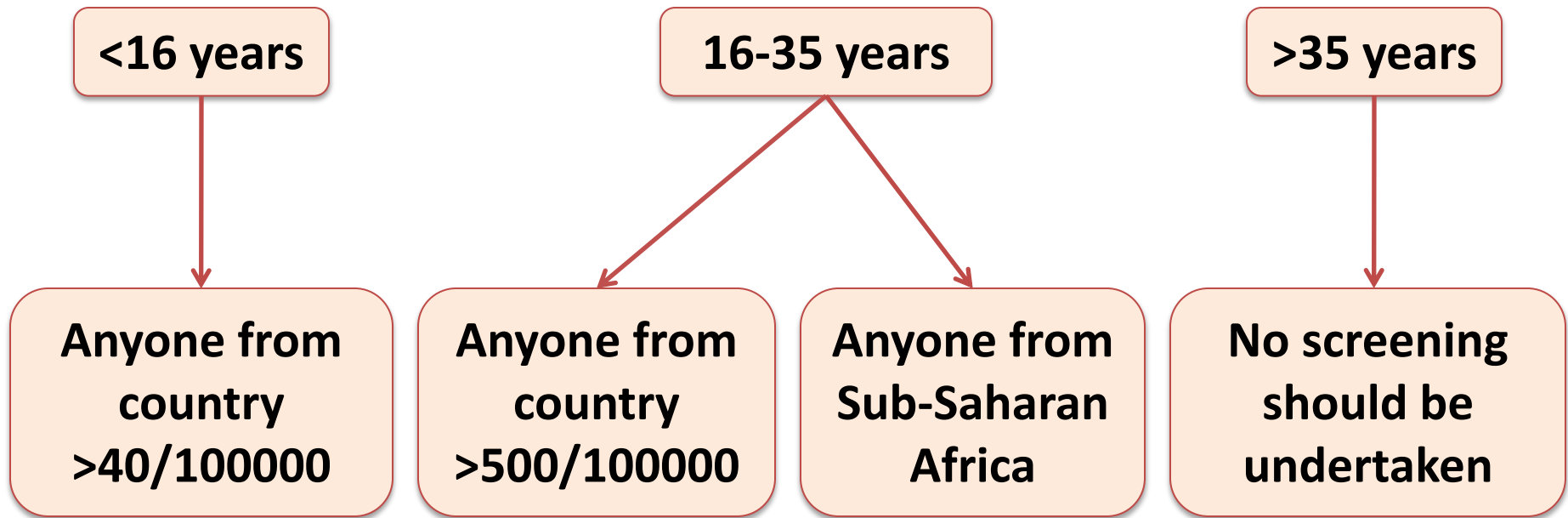






# National guidelines: increasing emphasis on diagnosing LTBI

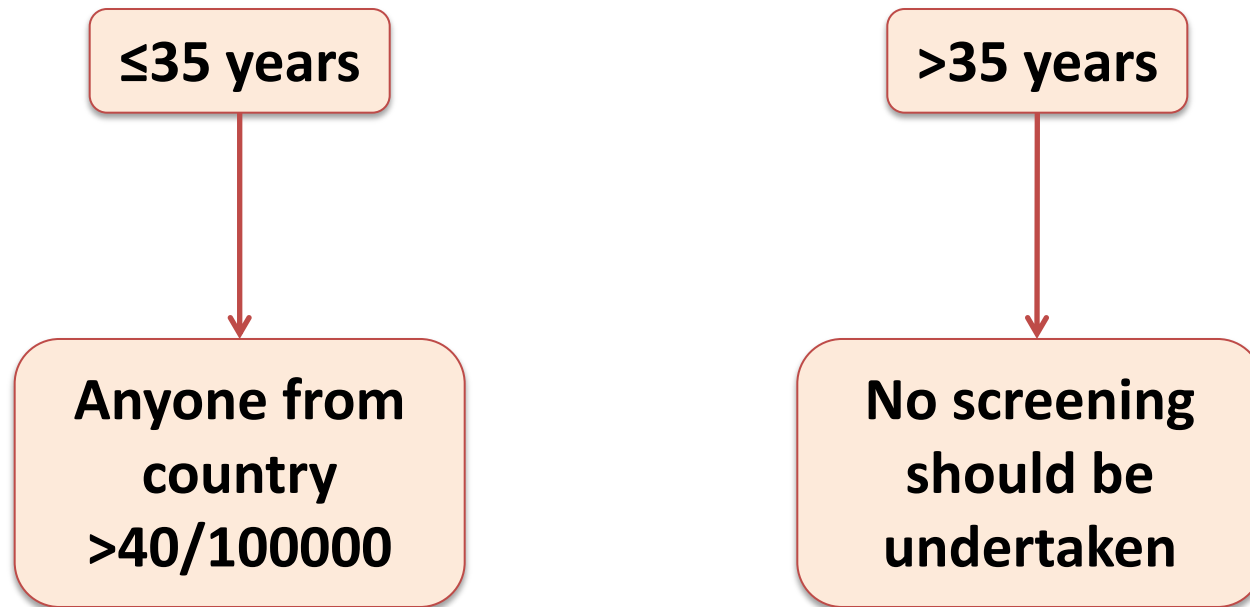
- Who should be screened for LTBI (NICE 2006)?



# National guidelines: increasing emphasis on diagnosing LTBI

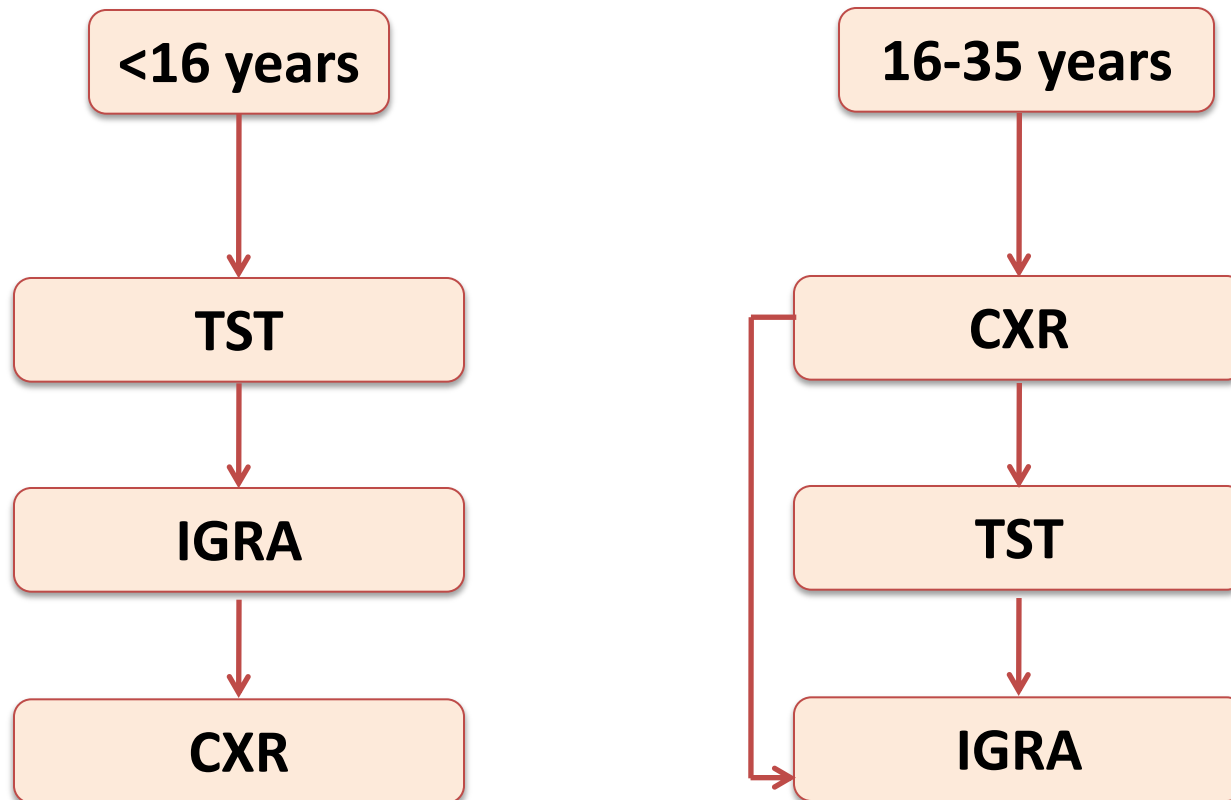
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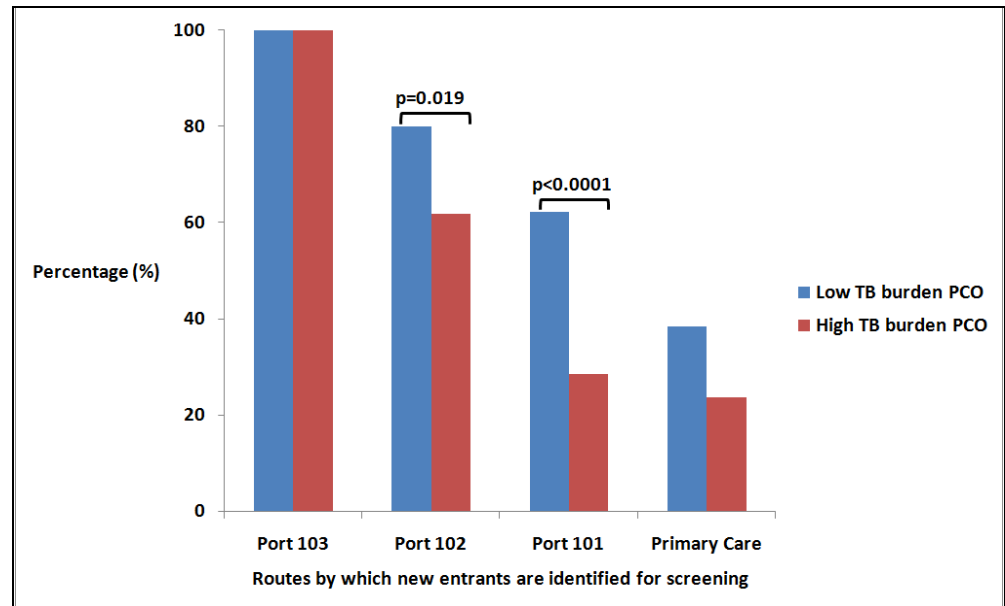
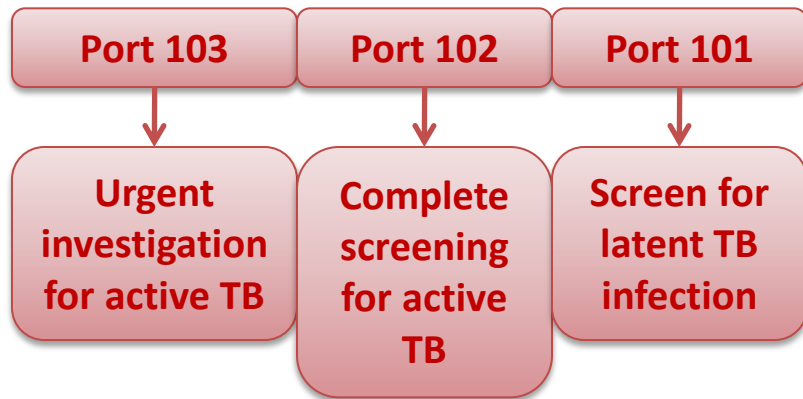


# National guidelines: increasing emphasis on diagnosing LTBI

- How to screen for LTBI?

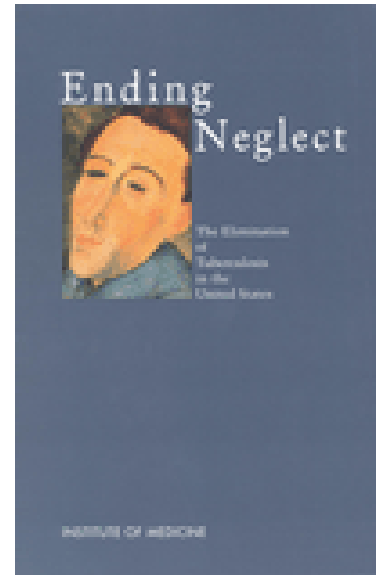
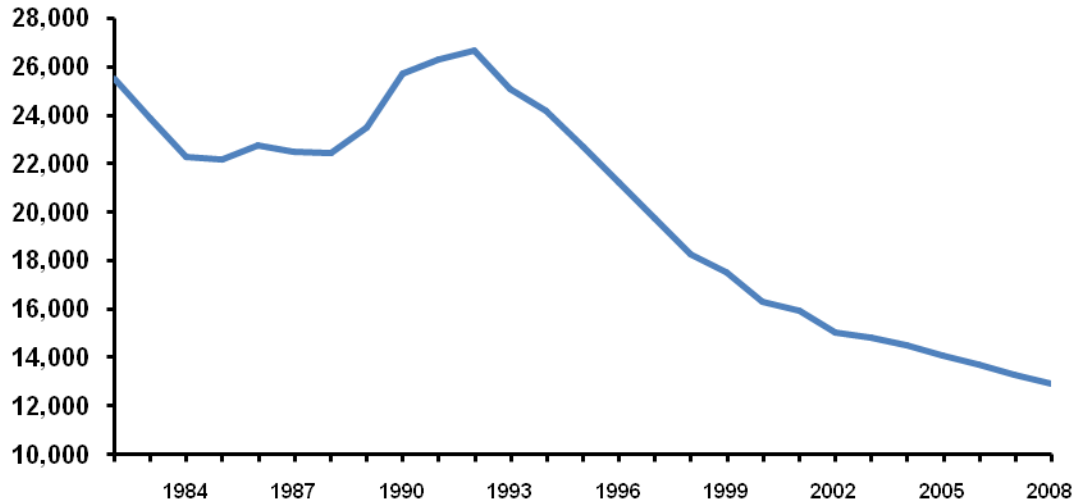


# Screening for LTBI in the UK is inconsistent and inversely related to TB burden



	Low burden PCO n=135 (%)	High burden PCO N=42 (%)	OR (95% CI)	P
Port 103	135 (100)	42 (100)	-	1.0
Port 102	108 (80)	26 (61.9)	0.41 (0.19-0.86)	0.019
Port 101	84 (62.2)	12 (28.6)	0.24 (0.11-0.52)	<0.0001
Primary Care	52 (38.5)	10 (23.8)	0.50 (0.23-1.1)	0.08

# Can the UK learn anything from other countries? The US as an example



- Institute of Medicine published an influential report
- Rigorous identification of LTBI in immigrants
  - >20/100000
  - Linked to visa/residency

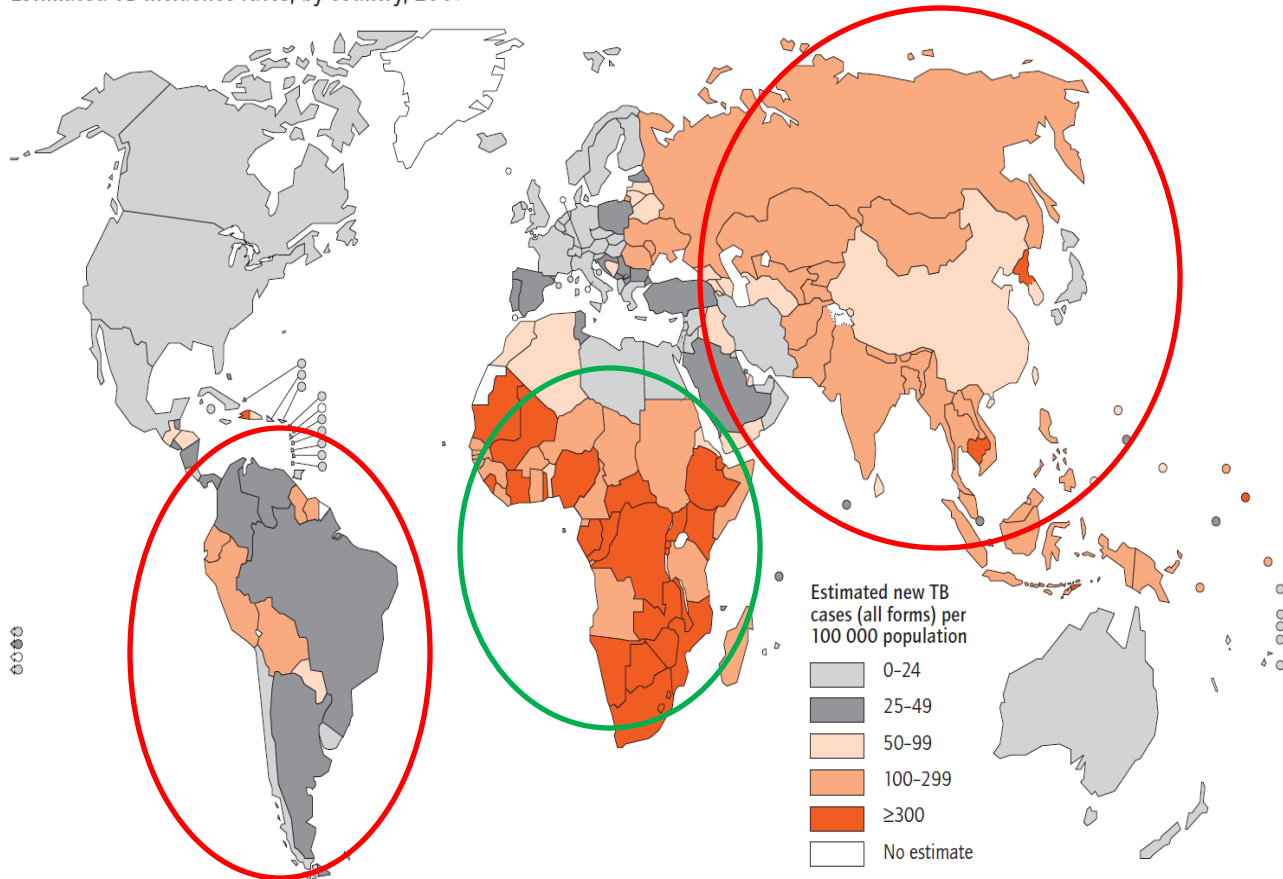
# Elements needed to improve the current system

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- **Increased importance on identifying LTBI**
- **Who to screen?**
- **When to screen?**
- **Where to screen?**
- **How to screen?**

# Improving the system: who to screen?

■ **FIGURE 1.2**  
Estimated TB incidence rates, by country, 2007





# Improving the system: who to screen?

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- **2006 system of immigrant screening not logical**
    - Misses all migrants from Indian Subcontinent, South America, Southeast Asia, North Africa
  - ↓
  - Account for >70% of foreign-born TB cases in the UK
- **Revise threshold downwards to make more migrants eligible for screening?**

# Health-economic analyses: screening at lower thresholds averts more cases of TB but with increased total costs

Screening threshold for immigrants (annual incidence per 100,000)		Cases of active TB (over 20 years)	Costs over 20 years (2010 GB pounds)	ICER (GBP per TB case averted)
Under 16	16-35 years			
None	None	95.4	608,370.0	Baseline
40	500	91.9	678,586.5	Extended dominance
40	400	91.8	683,710.0	Strict dominance
40	450	91.7	683,267.9	Extended dominance
40	350	90.8	697,208.7	Extended dominance
40	300	87.1	761,431.6	Extended dominance
40	250	83.4	823,312.8	17,956.0
40	500 +SSA	82.2	850,103.1	Extended dominance
40	200	71.1	1,121,093.2	Extended dominance
40	150	54.2	1,431,928.5	20,818.8
40	100	53.7	1,456,820.1	Extended dominance
40	40	50.9	1,527,478.5	29,403.1
All	All	50.9	1,532,256.6	101,938.3

# Health-economic analyses: screening at lower thresholds averts more cases of TB but with increased total costs

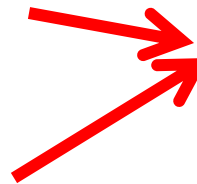
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# Improving the system: when to screen?

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Country of origin

Pre-arrival



- Aim to pick up active TB
- No screening for LTBI

At arrival

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Post-arrival

UK

# Post-arrival screening may be the best approach



Post-arrival

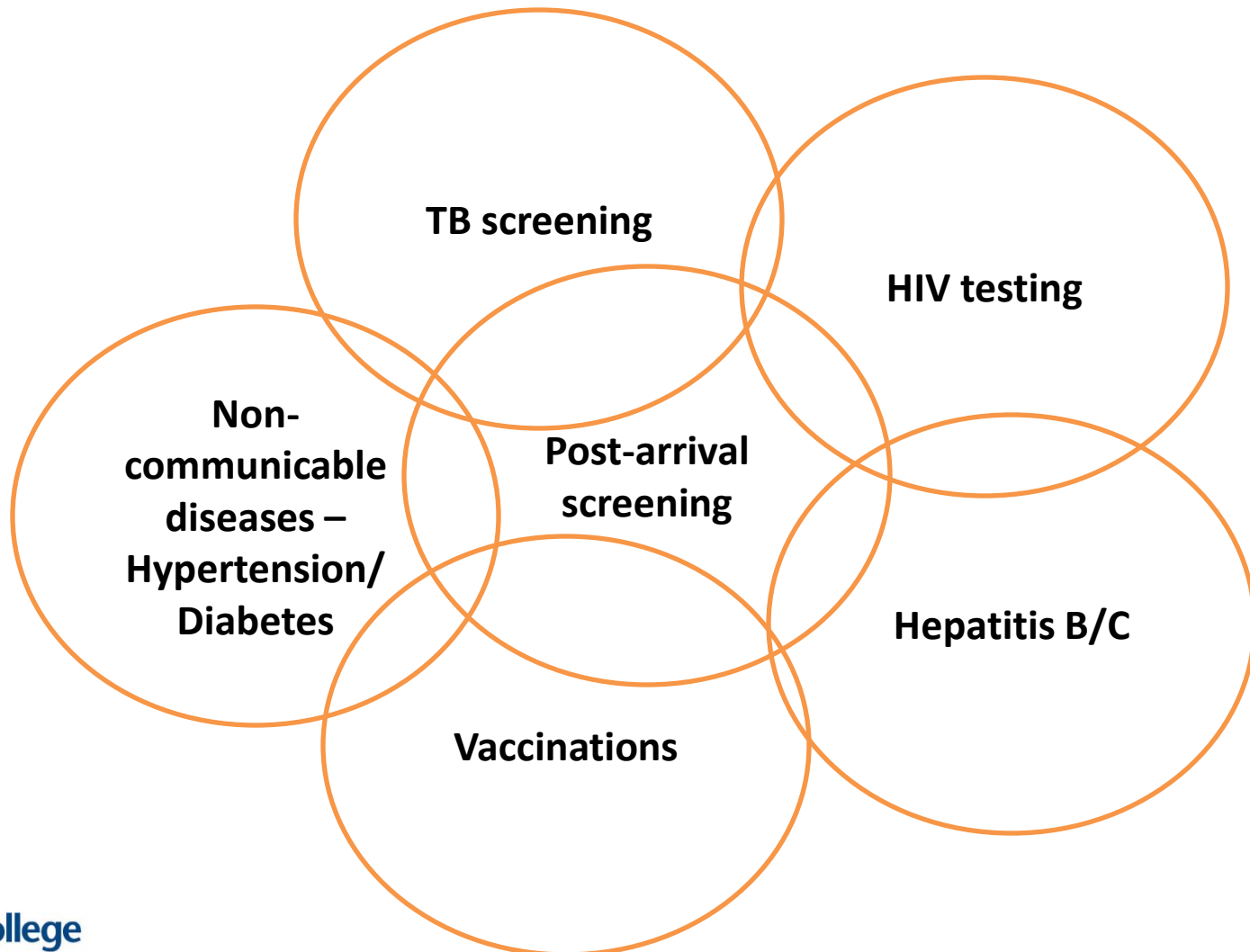


- Integrate with primary care systems
- Think holistically

UK

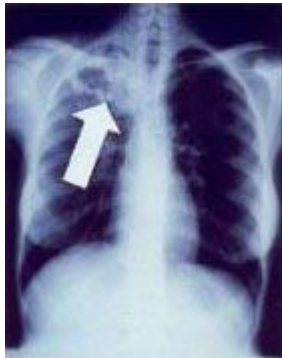
# Post-arrival screening facilitates wider migrant health programmes

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# Improving the system: how to screen?

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**CXR**



**Tuberculin  
skin test**



**IGRA**

# Summary

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- **TB continues to be a significant public health problem in developed countries – such as the UK**
- **High (and increasing) rates in the foreign-born**
  - **Driven by migration and reactivation of latent TB**
- **Current methods of TB screening focus on active TB**
- **Need to increase importance of LTBI screening**



# Thank you

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Any questions/comments?