

## Laria NW October 2015

# Projecting populations by ethnic group for local authorities, 2001 to 2051

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# Outline

- Population projections context
- Reflections on our previous projections and demographic estimates
- What we are doing to find out what works
- What we might do about what may not work!

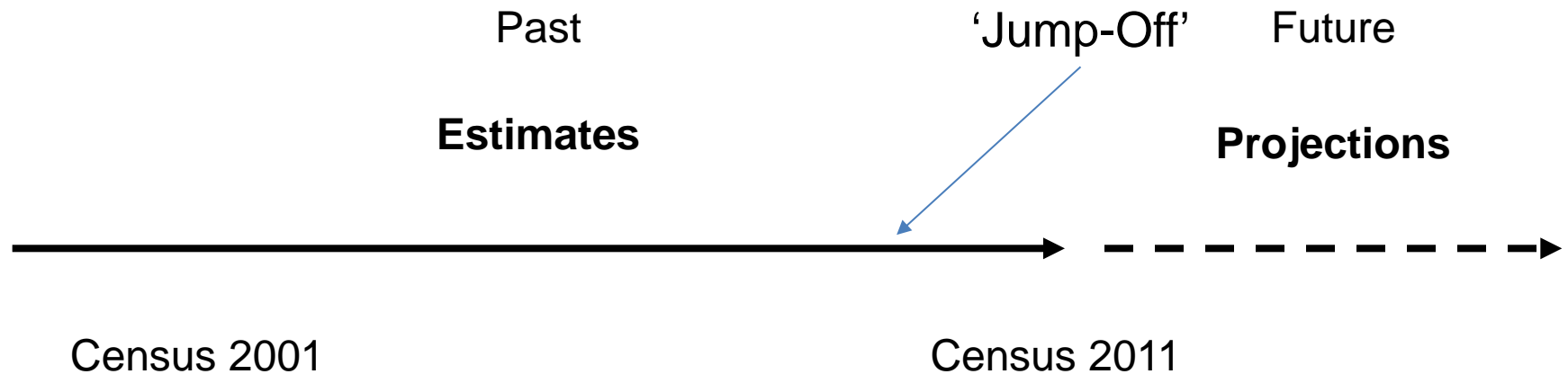
MATT

Daily Telegraph 30<sup>th</sup> August 2015



*'By 2100 the UK population will be one billion and everyone will be a member of the Lords'*

# What are population 'Estimates' > 'Projections'?



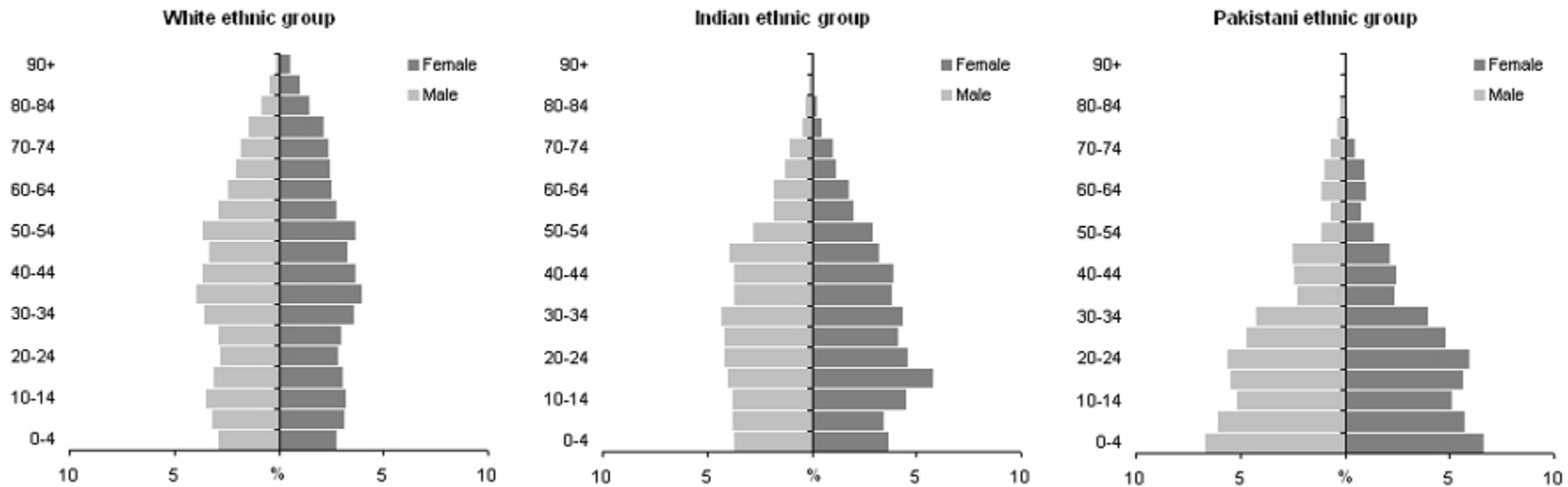
## **ETHPOP projections**

- England's local authorities
- Wales, Scotland & Northern Ireland
- Projections by 16 ethnic groups
- 2001 to c. 2008/9 to 2051

# Why project future populations by ethnic group & local area?

- Ethnicity: defined by self-identification
  - Country of birth / citizenship / family origin
  - Race, language, religion
- Age-sex counts of populations by ethnic group
  - Inform planning of relevant goods and services; appropriate housing and language support, denominators in rates
  - Help set targets for take-up of equal opportunities
  - Inform policy debates on international migration and diversity
- Improving projections for all persons
  - Accounting for different demographic behaviours by population subgroups
  - Accounting for geographical differences

# Subnational projections by ethnic group



## Age structure (& momentum ...)

& applying **ethnic & geographic** specific

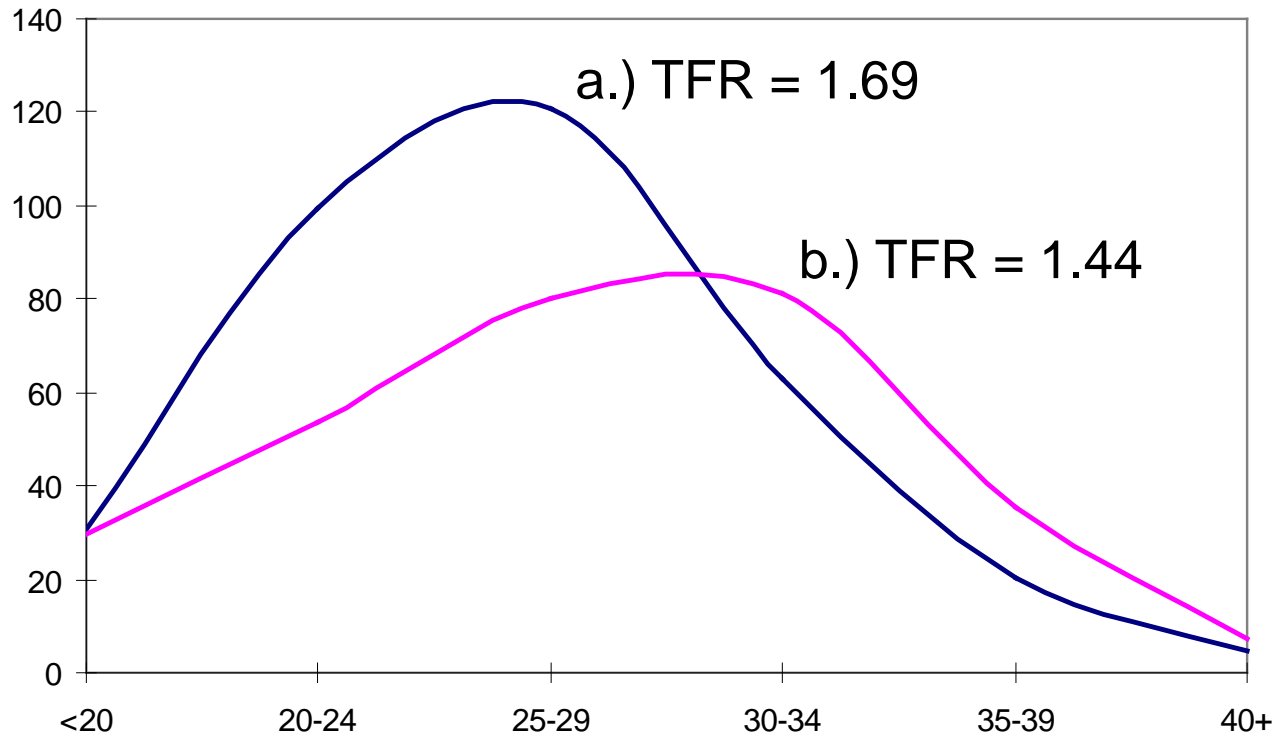
- Fertility
- Subnational & international migration
- Mortality

**All components  
need to be  
estimated**

... leads to different age-sex structures in the future

# Choice of demographic rates in a projection model

Age Specific Fertility Rates in a projection: applied to surviving women

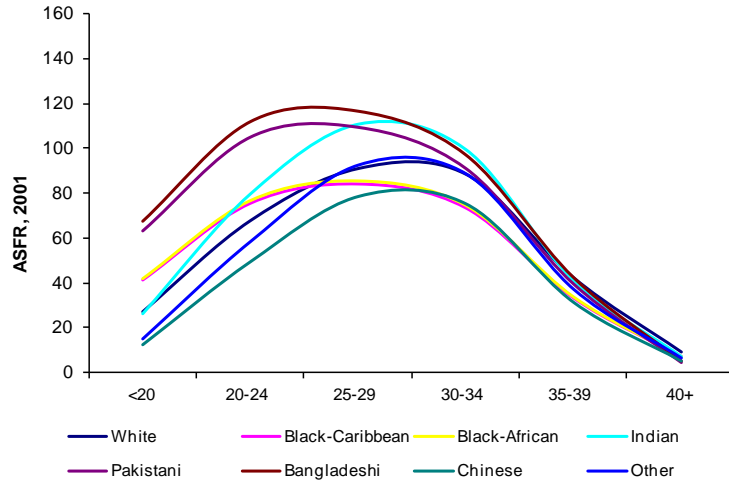


a.) 9,788 babies = 5,013 boys & 4,774 girls

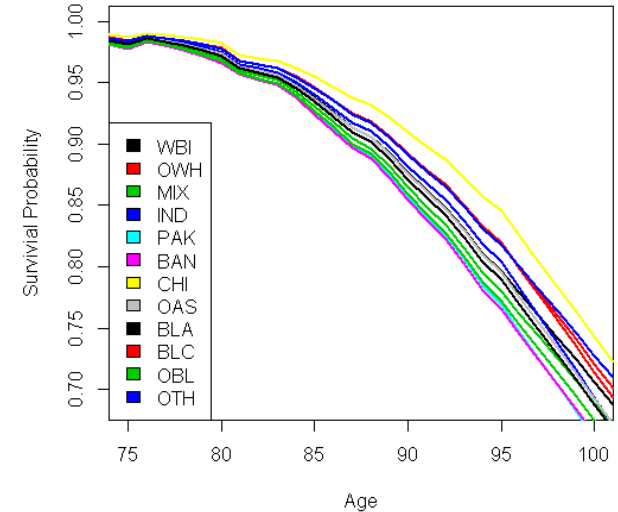
b.) 7,927 babies = 4,060 boys & 3,867 girls

# Estimating demographic rates by ethnic group

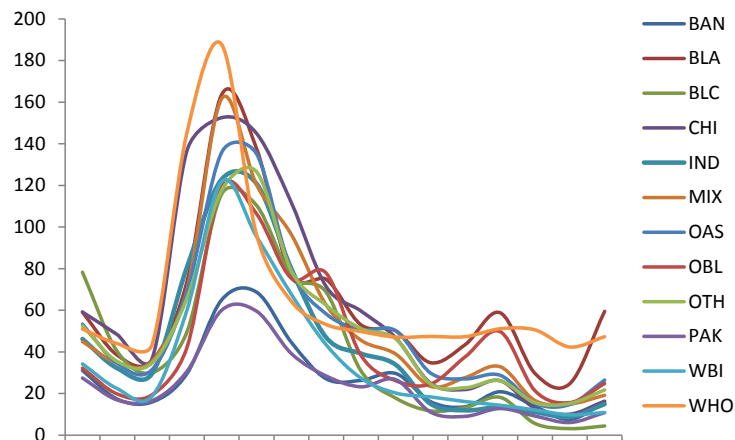
## Age-Specific Fertility Rates



## Probability of Survival (Males)

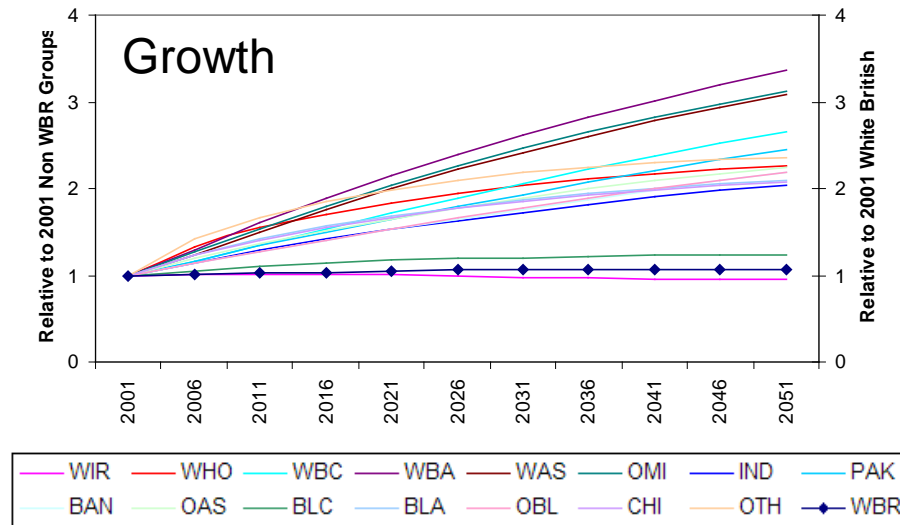


## Age-Specific Migration Rates

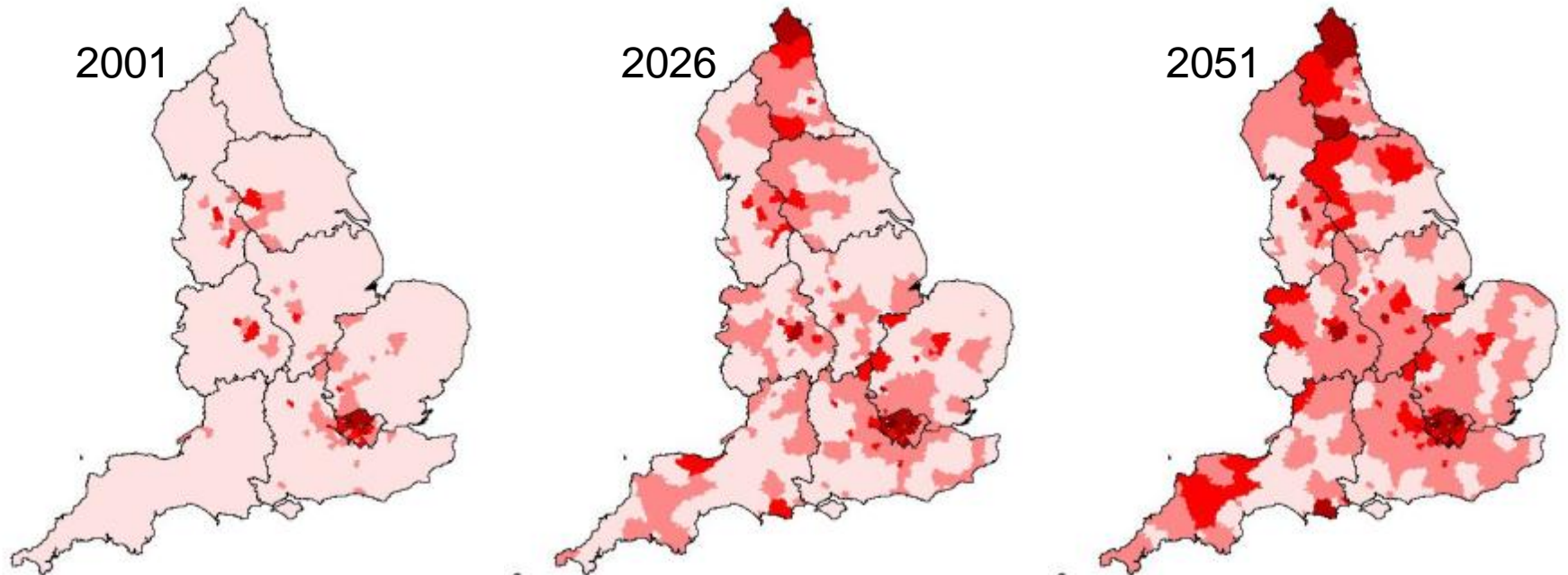


- For all components and subnational areas
- Plus assumptions about ongoing trends

# ETHPOP: Ethnic groups 2001-2051, England



## Index of Diversity 2001-2051



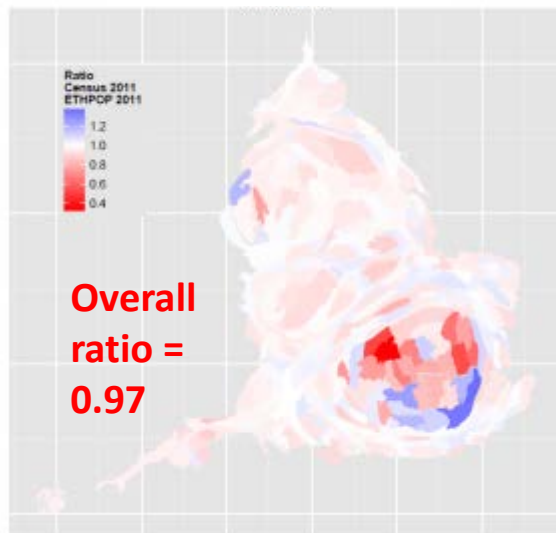


# NewETHPOP: Initial interim reflection

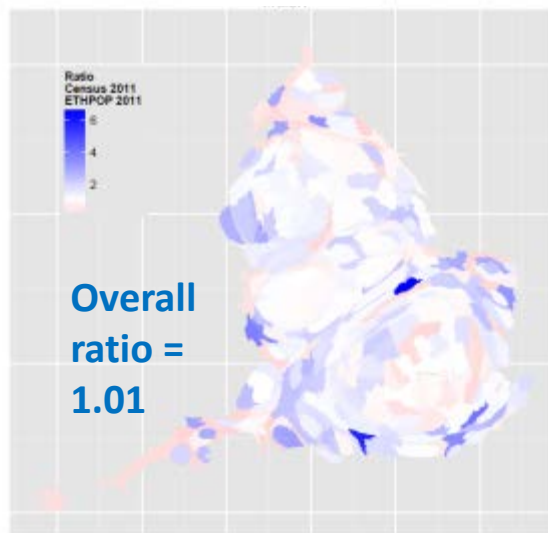
## 2011 projection outputs compared with 2011 Census

- 'White British' slightly over-projected
- Higher fertility groups under-projected
- 'Other White' under-projected

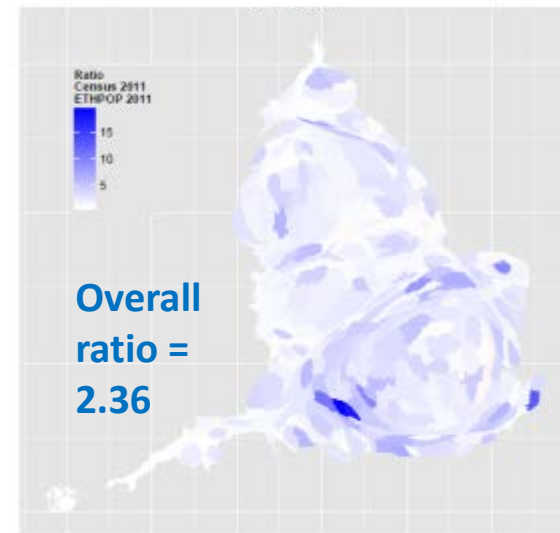
White British



Indian



Other Asian



## **NewETHPOP: 2001-2011**

12 ethnic groups (cf. 16 previously)

- Combines White British and White Irish into WBI
- One Mixed group (not four)

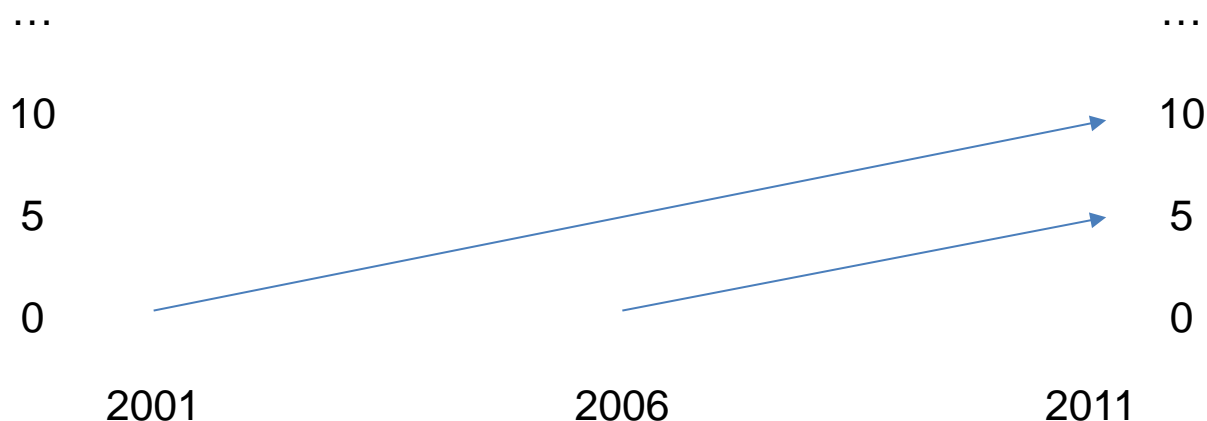
Full check of outputs (for England's LAs) with:

- Vital Statistics
- ONS Mid Year Estimates

Identify where and why differences between 'expected' (projected) & 'observed' (what actually happened)

## NewETHPOP: 2001 to 2011 accounts

Population accounts can help reveal differences between 'expected' (projected) and 'observed' (annual VS, MYEs & 2011 Census)

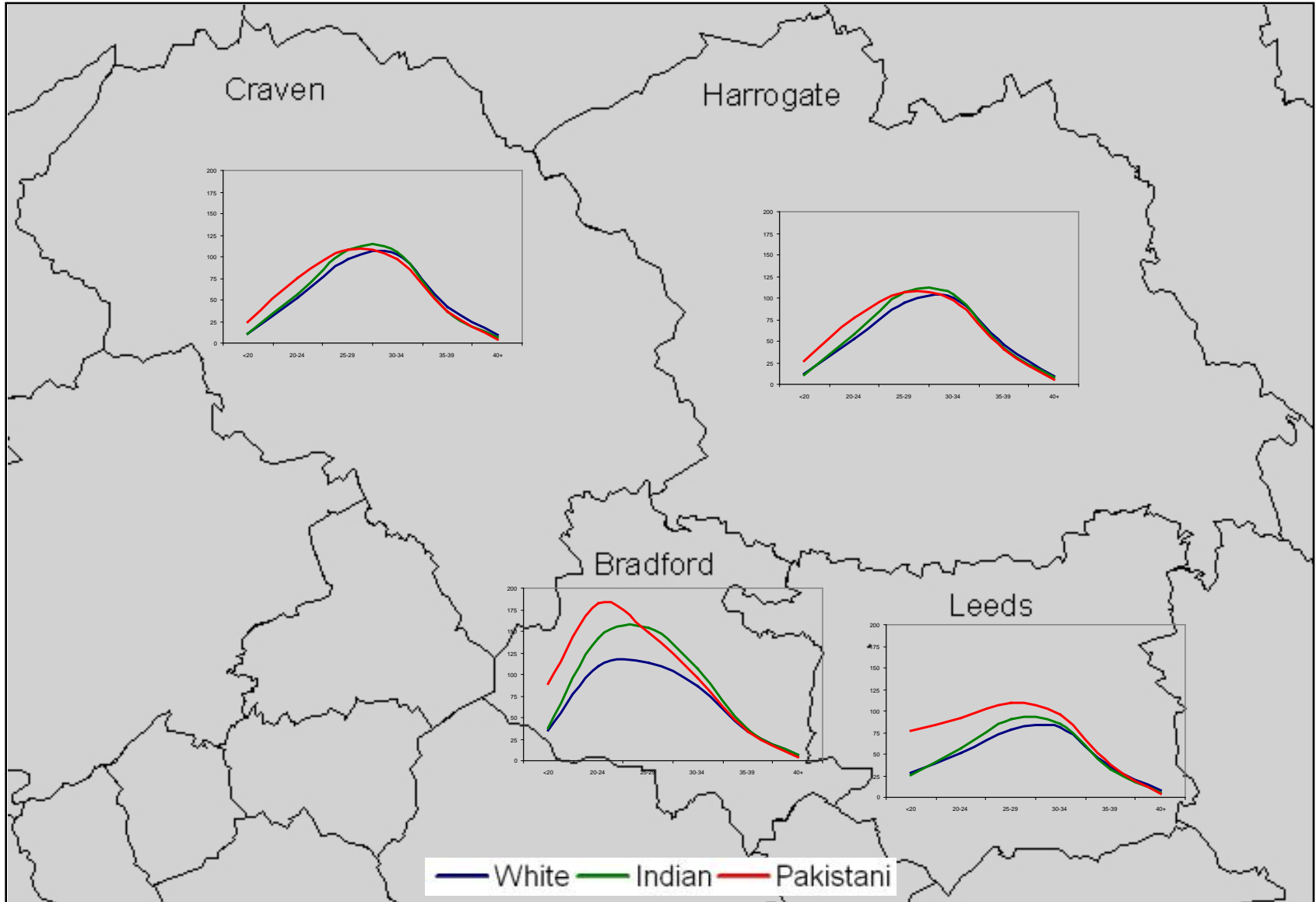


Differences due to:

- Fertility estimations by ethnic group & LA
- Assumptions about variations during 2001-11
- Estimations of subnational migration
- Impact of international migration

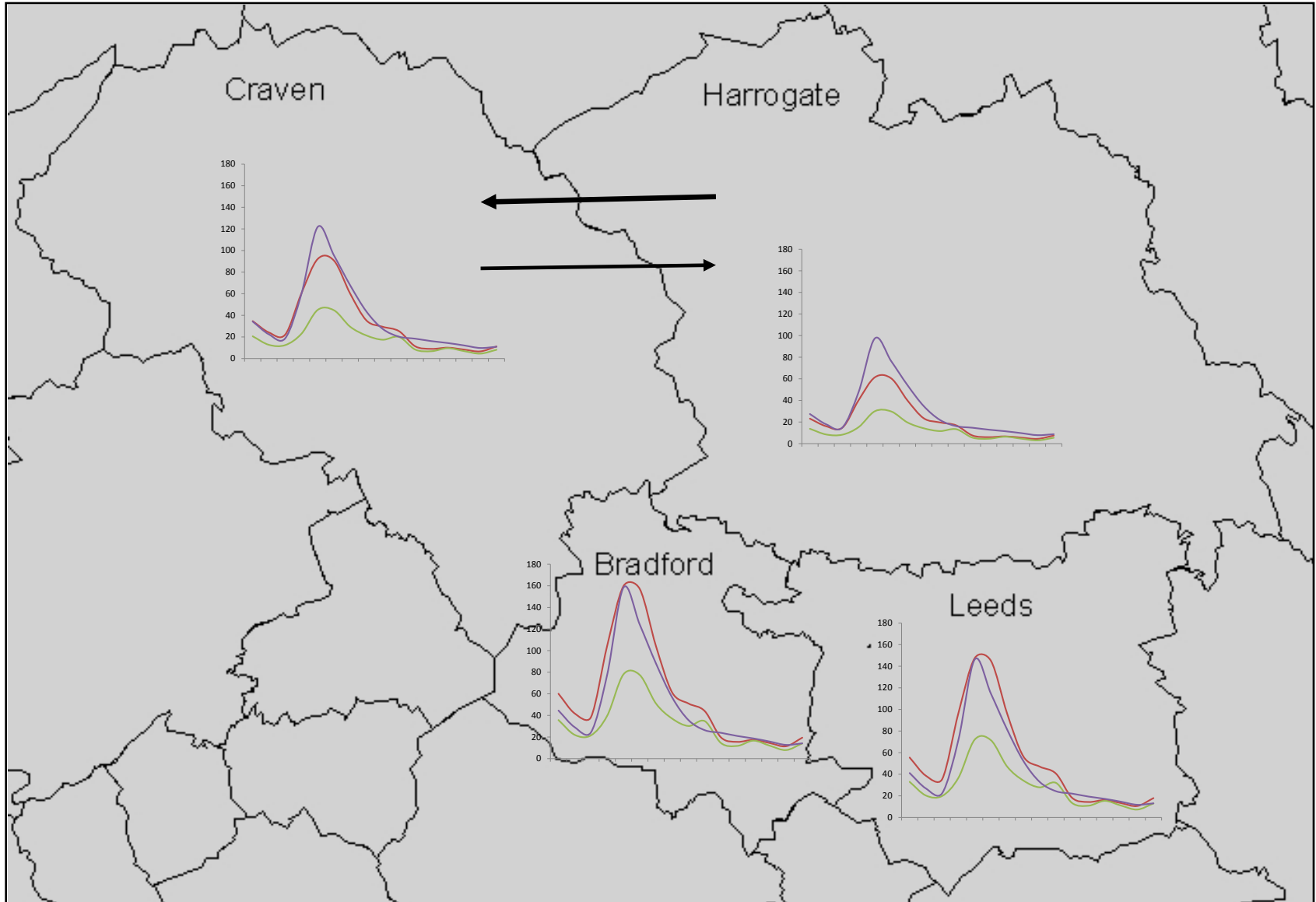
# NewETHPOP: 2001 to 2011 accounts

Assess whether Age-Specific Fertility Rates  $\approx$  VS & MYE



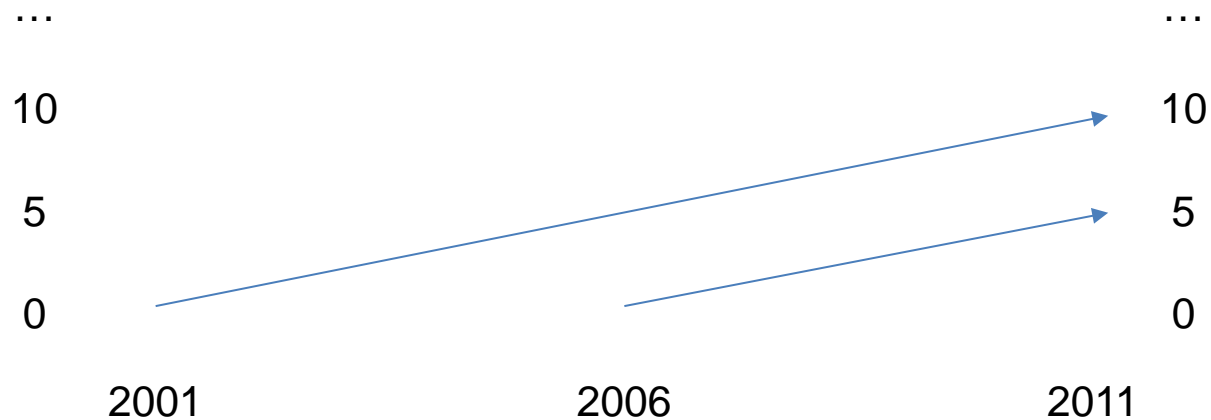
# NewETHPOP: 2001 to 2011 accounts

## Subnational migration flows: estimated



# NewETHPOP: 2001 to 2011 accounts

## International migration

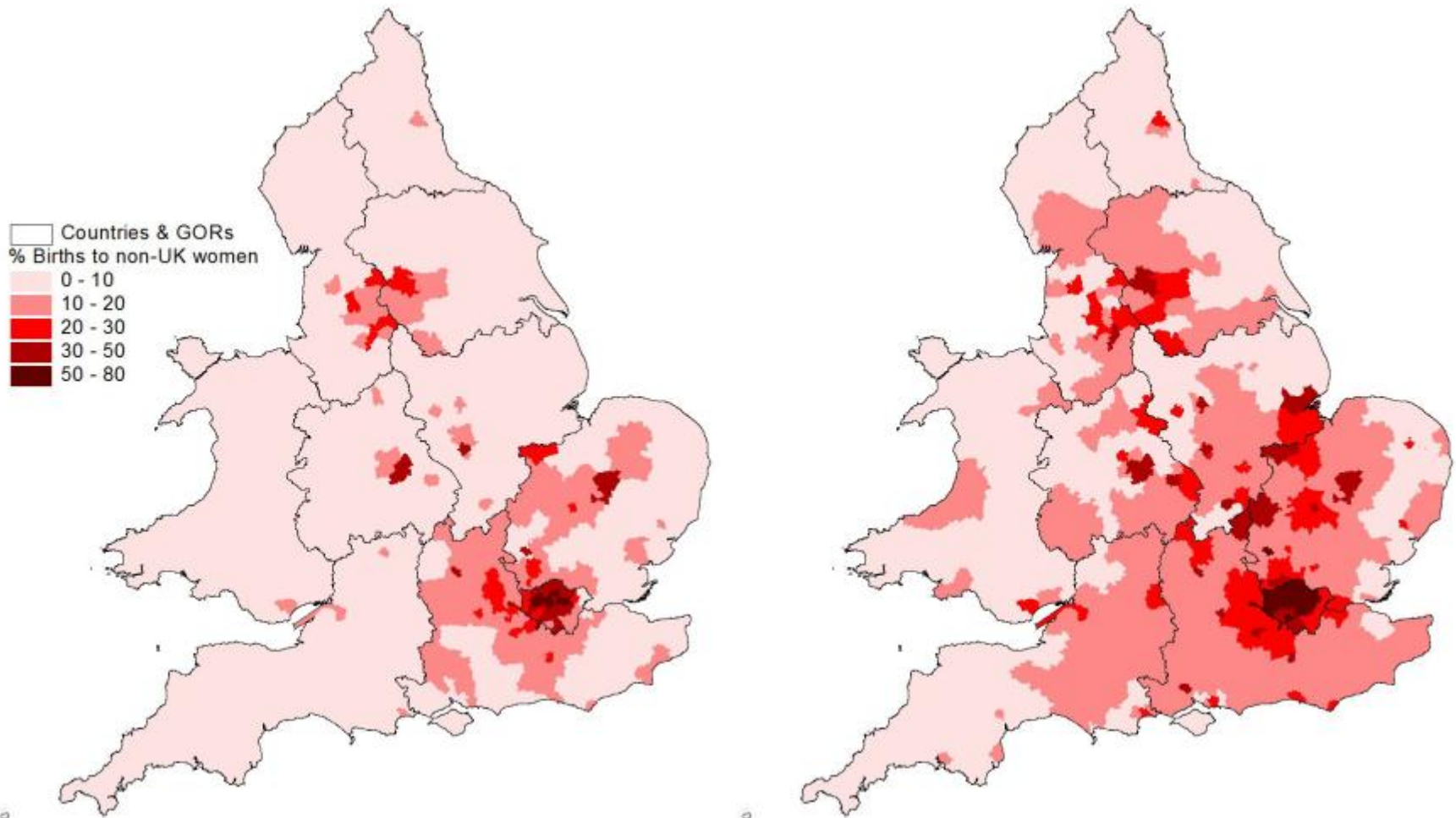


Projected numbers of children by 2011 may have errors

- If pre 2001 immigrants change their fertility
- If post 2001 immigrants have different fertility to current ethnic groups
- If people arrive post-2001 with children

# Influence of non-UK born mothers?

- Commissioned table births to UK cf. non-UK mothers
- 2001 has higher %s in traditional immigration centres
- 2011 shows greater dispersal with many areas at 10 – 30 %



# Appraising and improving projections by ethnic group

- Population accounts 2001-11 will reveal where ***expected*** drifts or steps away from ***observed***

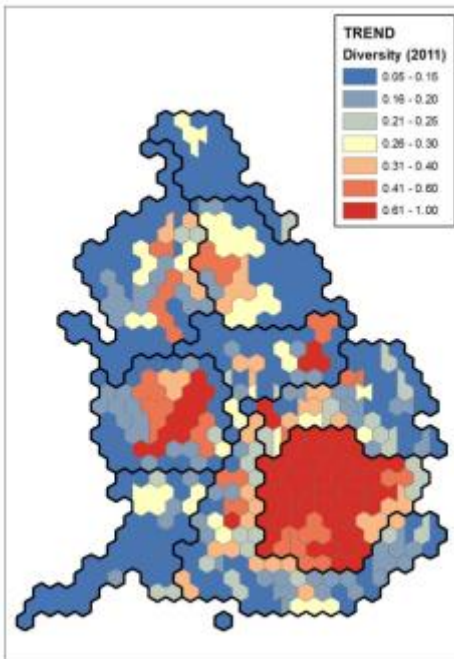
Due to:

- Choices of base and trended fertility rates
- Subnational migration
- Recent immigrants with and without infants
- Demographic behaviour over time & place
  - By different ethnic groups
  - By pre- & post-2001 immigrants
- Population accounts appraisal will inform revisions of projection inputs and assumptions of future change & what you can't anticipate!

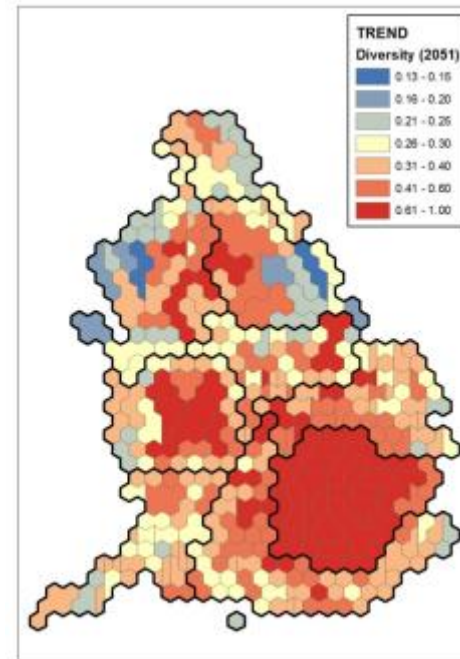


# 2011 Census adjusted projections by ethnic group

## Changing Ethnic Diversity of England's Local Populations

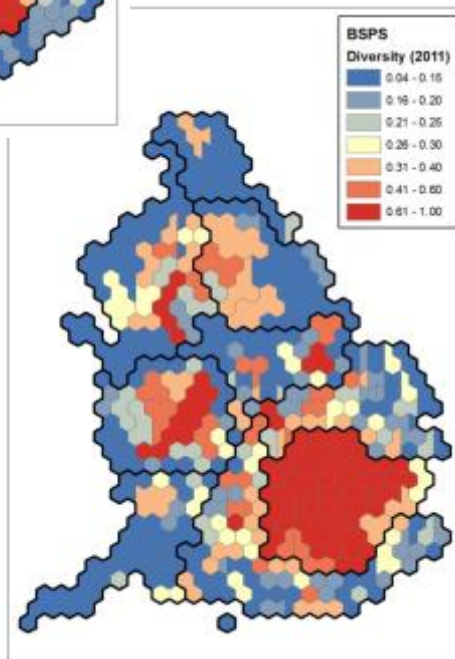


**TREDEF  
(2001-Based):  
MY 2011 Projection**

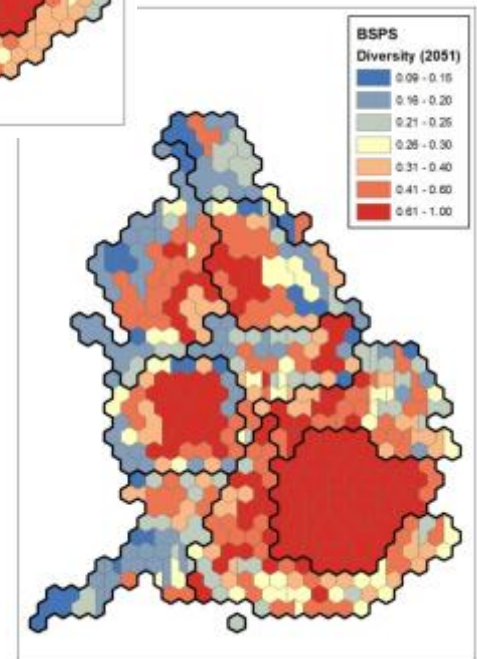


**TREDEF  
(2001-Based):  
MY2051 Projection**

**BSPS (2011-  
Based:  
MY2011  
Estimate  
(census based)**

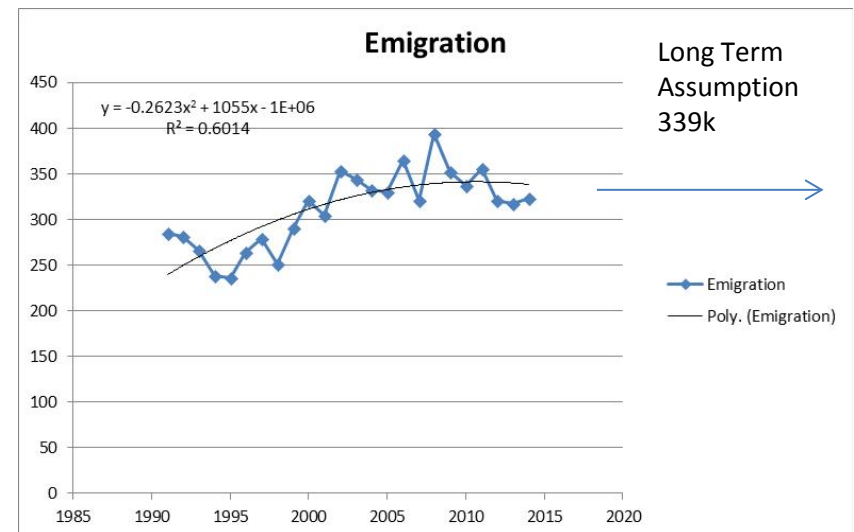
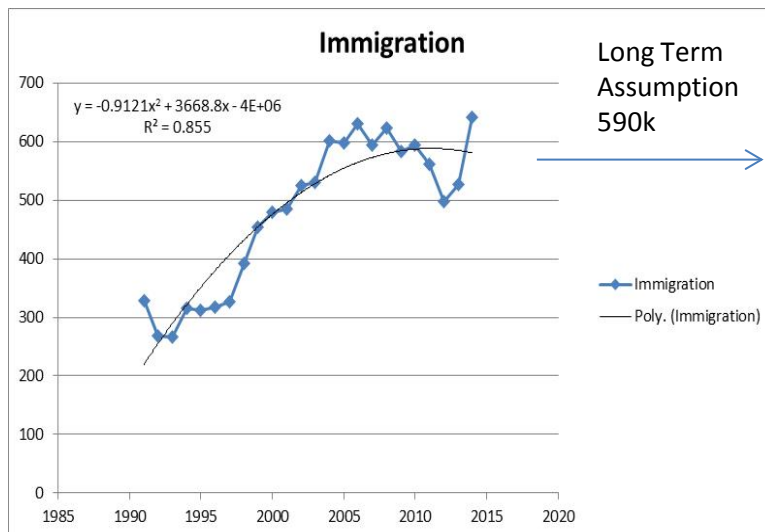


**BSPS (2011-  
Based:  
MY2051  
Projection**



# Appraising and improving projections by ethnic group

- NewETHPOP population projection will have
  - Complete UK coverage by LA
  - 12 Ethnic groups \* 2 UK born / Non-UK born
  - Switching between ethnic groups
- Ongoing assumptions on trends



# Updated ETHPOP website

POP  
BASE

## Welcome to the ETHPOP Database

The ETHPOP Database makes ethnic population projection on local area level available to interested users.

### Important news

- We performed a major update on all our projections by improving assumptions on internal migration, mortality in schedules in the youngest and oldest ages for women in the fertile age range. (28.9.2011)
- We made two more projections available one assuming constant demographic intensities since 2001 (BENCH) a international migration and with that simulating natural increase.(28.9.2011)
- We now also supply component data for all four available projections. (28.9.2011)

### Database Users Information

- [What is the ETHPOP database?](#)
- [User Guidelines and how to cite](#)
- [Request Access](#)
- [About Us](#)

Please report any errors in the results so that they can be corrected: [Contact](#)

The ETHPOP Database is part of the ESRC funded project

**Ethnic group population trends and projections for UK local areas: dissemination of innovative model outputs, documentation and skills**

1 October 2010 to 30 September 2011, ESRC Research Award RES-165-25-0162

# References (further reading!)

- Clark, S (2015) Modelling the Impacts of Demographic Ageing on the Demand for Health Care Services. PhD, University of Leeds.
- Lomax N, Stillwell J, Norman P & Rees P (2013) Sub-national migration in the United Kingdom: Producing a consistent time series using a combination of available data and estimates. *Journal of Population Research* 30(3): 265-288 DOI 10.1007/s12546-013-9115-z
- Lomax, N., Stilwell, J., Norman, P. and Rees, P. (2014) Internal migration in the United Kingdom: Analysis of an estimated inter-district time series, 2001-2011. *Applied Spatial Analysis and Policy* 7(1): 25-45 DOI 10.1007/s12061-013-9098-3
- Marshall A, Norman P & Plewis I (2013) Applying relational models to the graduation of disability schedules. *European Journal of Population* 29(4): 467-491 DOI 10.1007/s10680-013-9300-y
- Norman P, Marshall A, Thompson C, Williamson L & Rees P. (2012) Estimating detailed distributions from grouped sociodemographic data: 'get me started in' curve fitting using nonlinear regression. *Journal of Population Research* 29(2): 173-198 DOI: 10.1007/s12546-012-9082-9
- Norman P, Rees P & Wohland P (2014) The use of a new indirect method to estimate ethnic-group fertility rates for subnational projections for England. *Population Studies: A Journal of Demography* 68(1): 43-64 DOI: 10.1080/00324728.2013.810300
- Norman P, Rees P, Wohland P & Boden P (2010) Ethnic group populations: the components for projection, demographic rates and trends. Chapter 14 in Stillwell, J. and van Ham, M. (eds.) Ethnicity and Integration. Series: Understanding Population Trends and Processes. Springer: Dordrecht: 289-315
- Norman P, Simpson L and Sabater A (2008) 'Estimating with Confidence' and hindsight: new UK small area population estimates for 1991. *Population, Space and Place* 14(5): 449-472
- Rees P, Norman P & Brown D (2004) A framework for progressively improving small area population estimates. *Journal of the Royal Statistical Society A* . Vol. 167 Part 1: 5-36
- Rees P, Parsons J & Norman P (2005) Making an estimate of the number of people & households for Output Areas in the 2001 Census. *Population Trends* 122: 27-34
- Rees P, Wohland P & Norman P (2009) The estimation of mortality for ethnic groups at local scale within the United Kingdom. *Social Science & Medicine* 69: 1592-1607
- Rees P, Wohland P & Norman P (2013) The demographic drivers of future ethnic group populations for UK local areas 2001-2051. *Geographical Journal* 179(1): 44-60 doi: 10.1111/j.1475-4959.2012.00471.x
- Rees P, Wohland P, Norman P & Boden P (2011) A local analysis of ethnic group population trends and projections for the UK. *Journal of Population Research* 28(2): 129-148 doi: 10.1007/s12546-011-9047-4
- Rees P, Wohland P, Norman P & Boden P (2012) Ethnic population projections for the UK, 2001-2051. *Journal of Population Research* 29(1): 45-89 DOI 10.1007/s12546-011-9076-z
- Rees P, Zuo C, Wohland P, Jagger C, Norman P, Boden P & Jasinska M (2013) The implications of ageing and migration for the future population, health, labour force and households of Northern England. *Applied Spatial Analysis & Policy* 6: 93-122 DOI: 10.1007/s12061-013-9086-7
- Rees P., Wohland P., Norman P. and Boden P. (2011) A local analysis of ethnic group population trends and projections for the UK. *Journal of Population Research*, 28(2-3): 149-184.
- Rees, P and Clark S (2014) The projection of ethnic group populations aged 18 and over for Westminster parliamentary constituencies in Great Britain for election years 2015, 2020, 2025, 2030 and 2035. A Report to the Policy Exchange, 10 Storey's Gate, London SW1P 3AY
- Rees, P, Norman P and Durham H (2015) Working Paper 15: Urban Ethnic Disparities. Foresight Future of Cities Project, Government Office for Science.
- Rees, P., Wohland, P., Norman, P. and Boden, P. (2012) Ethnic population projections for the UK, 2001-2051. *Journal of Population Research*, 29(1): 45-89.
- Rees, P., Wohland, R., Norman, P. D., & Lomax, N. (2015). Sub-national projection methods for Scotland and Scottish areas: a review and recommendations.
- Stillwell J, Hussain S & Norman P (2008) The internal migration propensities and net migration patterns of ethnic groups in Britain. *Migration Letters* 5(2): 135-150
- Tromans N, Natamba E, Jefferies J & Norman P (2008) Have national trends in fertility between 1986 and 2006 occurred evenly across England and Wales? *Population Trends* 133: 7-19
- Williamson L & Norman P (2011) Developing strategies for deriving small population fertility rates. *Journal of Population Research* 28(2): 149-183, doi:10.1007/s12546-011-9059-0