

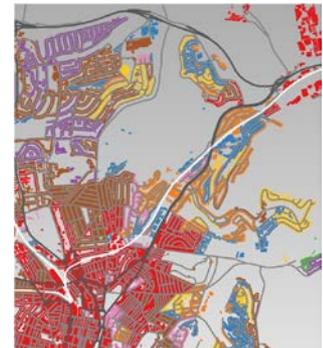
# Why censuses are essential for estimating ethnic populations and components of change

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Based on Chapter 21, Using the 2001 and 2011 Censuses to Reconcile Ethnic Group Estimates and Components for the Intervening Decade for English Local Authority Districts, in John Stillwell (edited) **A Handbook of Census Resources, Methods and Applications: Unlocking the UK 2011 Census**



# Outline

## 21.1 Introduction

Roll forward projections from 2001 produce inaccurate 2011 populations

## 21.2 Estimating ethnic populations and components between censuses

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## 21.4 Time and age-time frameworks for inter-census estimates

## 21.5 Estimation of mid-year populations and populations-at-risk

## 21.6 The estimation of ethnic components of change:

Fertility estimates between CBBEs

Mortality estimates between CBBEs

Internal migration estimates between CBBEs

International migration estimates between CBBEs

## 21.7 (Some Results)

## 21.8 Discussion and conclusions

## 21.1 Introduction

- Why is ethnicity important?
- How to measure ethnicity
- Ethnicity and the immigration debate
- Estimating ethnic populations at sub-national scale
  - LFS/APS estimates
  - Roll forward estimates (Large and Ghosh)
  - ONS stop producing LAD estimates after 2009
  - No current plans to revive
  - Enquiries referred to Leeds project team

# How well did we do in 2011?

**Table 10.3** The England and Wales populations of five ethnic groupings: Census 2011 and ETHPOP 2011

Ethnic grouping (2011 definitions)	Census Population CD 2011  (thousands)	Average of TREND and UPTAPER Projections, MY2011  (thousands)	Difference = Average Projection minus Census  (thousands)	100 × (Difference /Census)  (%)
All Groups	56,076	56,057	-18	-0.03
White	48,209	49,609	1,400	2.90
Black	1,865	1,521	-344	-18.44
Asian	4,214	3,469	-744	-17.66
Mixed	1,224	1,017	-207	-16.90
Other	564	440	-124	-21.92

Sources: Census 2011 – ONS (2013c), Crown Copyright.

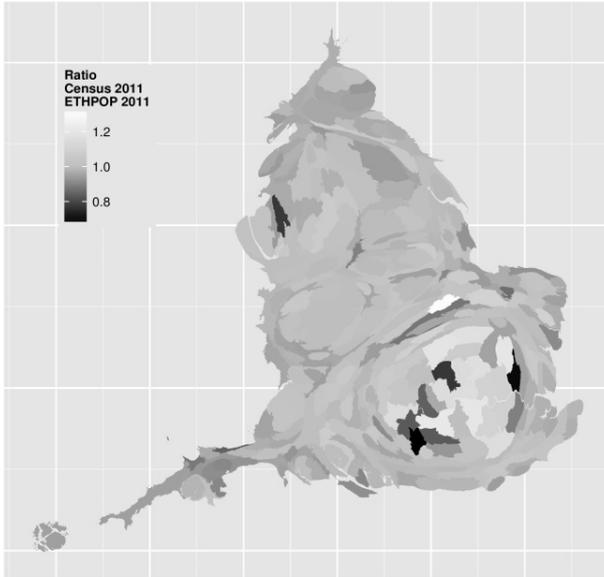
Projections – ETHPOP (2013), funded by ESRC.

Notes: CD = Census date (27 March 2011), MY = Mid-YEAR (30 June/1 July).

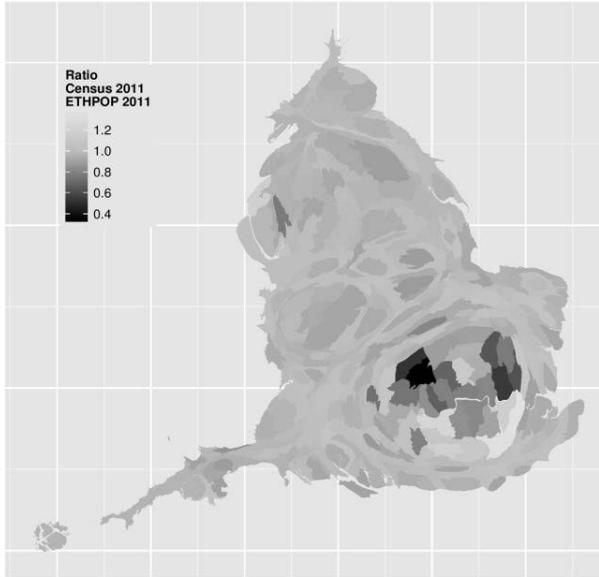
## Key points:

- Very close for the total
- Over-estimated the White group (too optimistic about mortality trend)
- Poor for the ethnic minority groups (under-estimated immigration and fertility)

ALL



White British



Indian



Other Asian



Local results  
for selected  
groups

Quite large errors at  
the LAD scale

# 21.2 Estimating ethnic populations and components between censuses

## The issue

- This problem with the roll forward method is general to local population estimation.
- After every census ONS revises the LAD populations so that they are consistent with the latest census and the previous census.
- This upsets many local authorities. They had looked forward to the same central government grant based on population and complained when their optimistic future funding bubbles were burst. This led to huge rows between some LADs and ONS post-census (e.g. Westminster-ONS battle over 2001 Census results).

## The solution

- Correct any census errors
- Revise estimates between censuses so that the population series links the start and end censuses in a decade
- Note that this then necessitates a revision of demographic rates and re-evaluation of trends
- Fortunately for LADs, funding is not recouped and redistributed to reflect the revisions

## Our Aim

- To implement a similar reconciliation exercise for LAD sub-populations by ethnicity

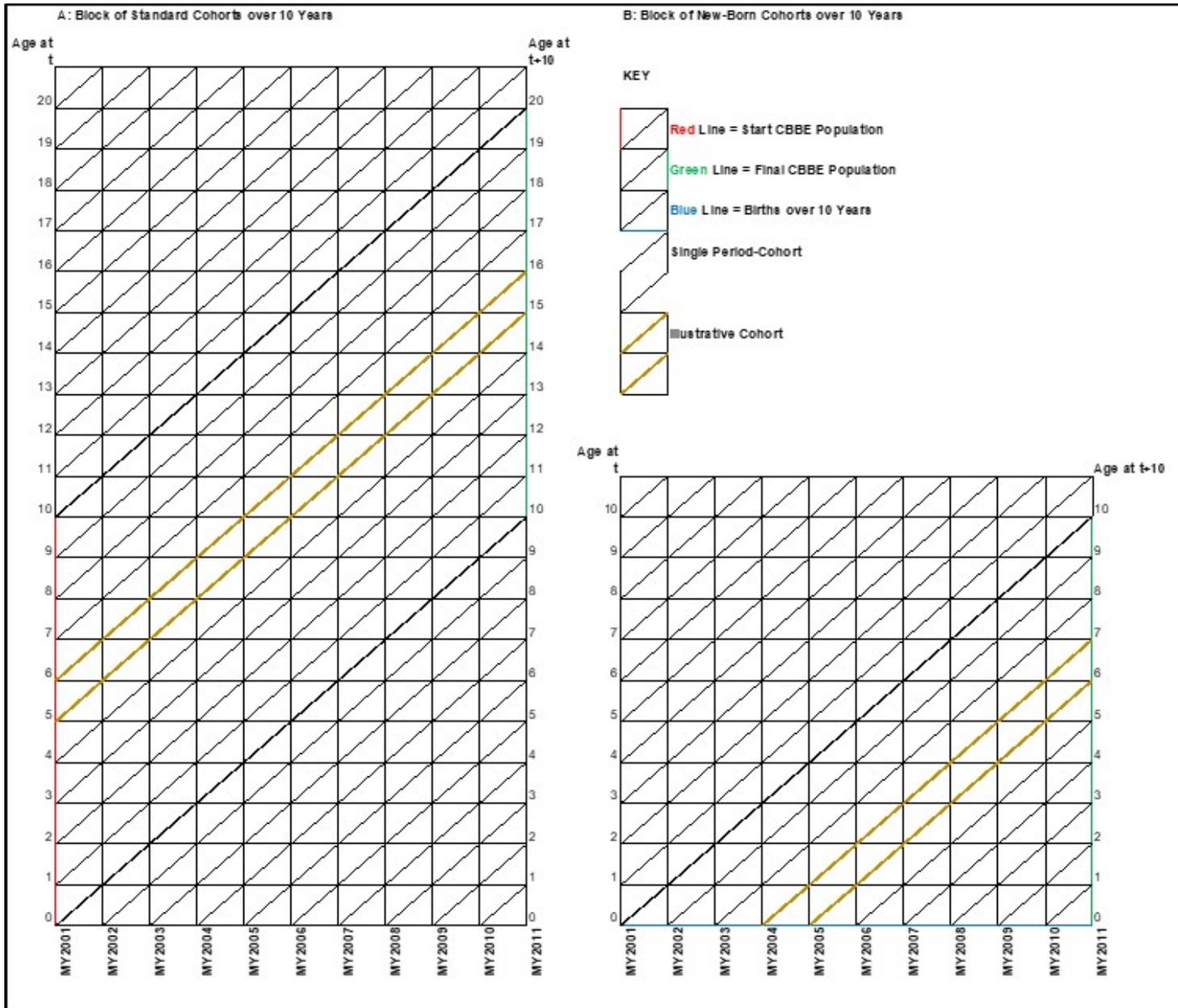
## 21.3 Getting the census populations into shape

New ETHPOP number	New ETHPOP	NewETHPOP classification	England and Wales classification: KS201EW	Scotland classification: KS201SC	Northern Ireland classification: KS201NI
1	WBI	White: British, Irish, Gypsy, Irish Traveller	White: English/Welsh/Scottish/Northern Irish/British White: Irish White: Gypsy or Irish Traveller	White: Scottish White: Other British White: Irish White: Gypsy/Traveller	White: Not Other White Irish Traveller
2	WHO	White: Other White	White: Other White	White: Polish White: Other White	White: Other White
3	MIX	Mixed/Multiple Ethnic Groups	Mixed/multiple ethnic group: White and Black Caribbean Mixed/multiple ethnic group: White and Black African Mixed/multiple ethnic group: White and Asian Mixed/multiple ethnic group: Other Mixed	Mixed or multiple ethnic groups	Mixed
4	IND	Asian/Asian British: Indian	Asian/Asian British: Indian	Asian, Asian Scottish or Asian British: Indian, Indian Scottish or Indian British	Indian
5	PAK	Asian/Asian British: Pakistani	Asian/Asian British: Pakistani	Asian, Asian Scottish or Asian British: Pakistani, Pakistani Scottish or Pakistani British	Pakistani
6	BAN	Asian/Asian British: Bangladeshi	Asian/Asian British: Bangladeshi	Asian, Asian Scottish or Asian British: Bangladeshi, Bangladeshi Scottish or Bangladeshi British	Bangladeshi
7	CHI	Asian/Asian British: Chinese	Asian/Asian British: Chinese	Asian, Asian Scottish or Asian British: Chinese, Chinese Scottish or Chinese British	Chinese
8	OAS	Asian/Asian British: Other Asian	Asian/Asian British: Other Asian	Asian, Asian Scottish or Asian British: Other Asian	Other Asian
9	BLA	Black/Black British: African	Black/African/Caribbean/Black British: African	African: African, African Scottish or African British African: Other African	Black African
10	BLC	Black/Black British: Caribbean	Black/African/Caribbean/Black British: Caribbean	Caribbean or Black: Black, Black Scottish or Black British Caribbean or Black: Caribbean Scottish or Caribbean British	Black Caribbean
11	OBL	Black/Black British: Other Black	Black/African/Caribbean/Black British: Other Black	Caribbean or Black: Other Caribbean or Black	Black Other
12	OTH	Other Ethnic Group	Other ethnic group: Arab Other ethnic group: Any other ethnic group	Other ethnic groups: Arab, Arab Scottish or Arab British Other ethnic groups: Other ethnic group	Other

## 21.4 Time and age-time frameworks for inter-census estimates

**Figure 21.1** A time framework for estimation and projection of populations and components by ethnicity

Calendar Years	2000	2001	2002	2003	...	2009	2010	2011	2012	2013	2014
Mid-Year to Mid Year		2000-2001	2001-2002	2002-2003	...	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	
Fertility Component (Calendar Years)					...						
Fertility Component (Mid Years)					...						
Mortality Component (Calendar Years)					...						
Mortality Component (Mid Years)					...						
Internal Migration Component (Mid Years)					...						
International Migration Component (Mid Years)					...						
Notes: Mid Years = time interval between a mid-year and the next	Key: Populations Census Based Book End Populations Populations at risk (Calendar Years) Populations at risk (Mid Years)					Key: Components Census Based Book End Components Interpolated Components Roll Forward Components					



**Figure 21.2**  
Age-time  
diagram for  
standard  
and new-  
born period-  
cohorts over  
10 years

## 21.5 Estimation of mid-year populations and populations at risk

Equation for interpolating between CBBEs for population existing at the first census:

$$P_{g,x+y,e}^{i,2001+y} = P_{g,x,e}^{i,2001} + \left(\frac{y}{10}\right) \times [P_{g,x+10,e}^{i,2011} - P_{g,x,e}^{i,2001}] \quad (21.1)$$

where  $P$  stands for population,  $i$  for LAD,  $g$  for gender,  $x$  for age (0, 100+) and  $e$  for ethnicity;  $y$  ( $= 1, 9$ ) is the mid-year number counting forward from year zero (mid-year 2001). A tenth of the difference between the 2001 and 2011 CBBE populations in the same cohort, 10 years of age apart, is multiplied by the year index and added to the mid-2001 population. This equation applies to the cohorts aged 0-100+ at mid-year 2001.

Equation for interpolating between births between censuses and the population at the second census:

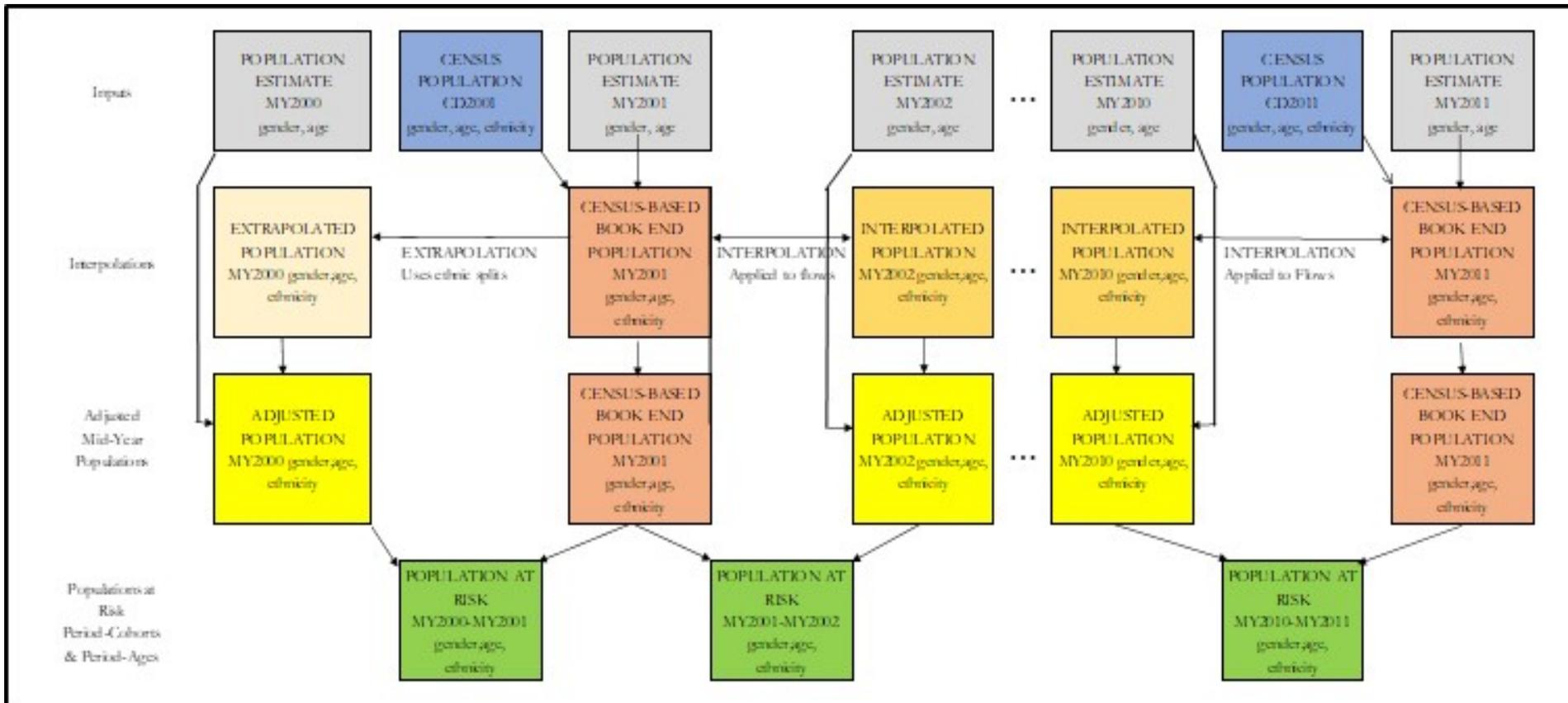
$$P_{g,x,e}^{i,2001+(10-y)+x} = B_{g,e}^{i,2001+(10-y)} + \left(\frac{x+0.5}{y+0.5}\right) \times [P_{g,y,e}^{i,2011} - B_{g,e}^{i,2001+(10-y)}] \\ \forall y \in [9,0], x \in [0, y-1] \quad (21.2)$$



**Technical  
Stuff!**

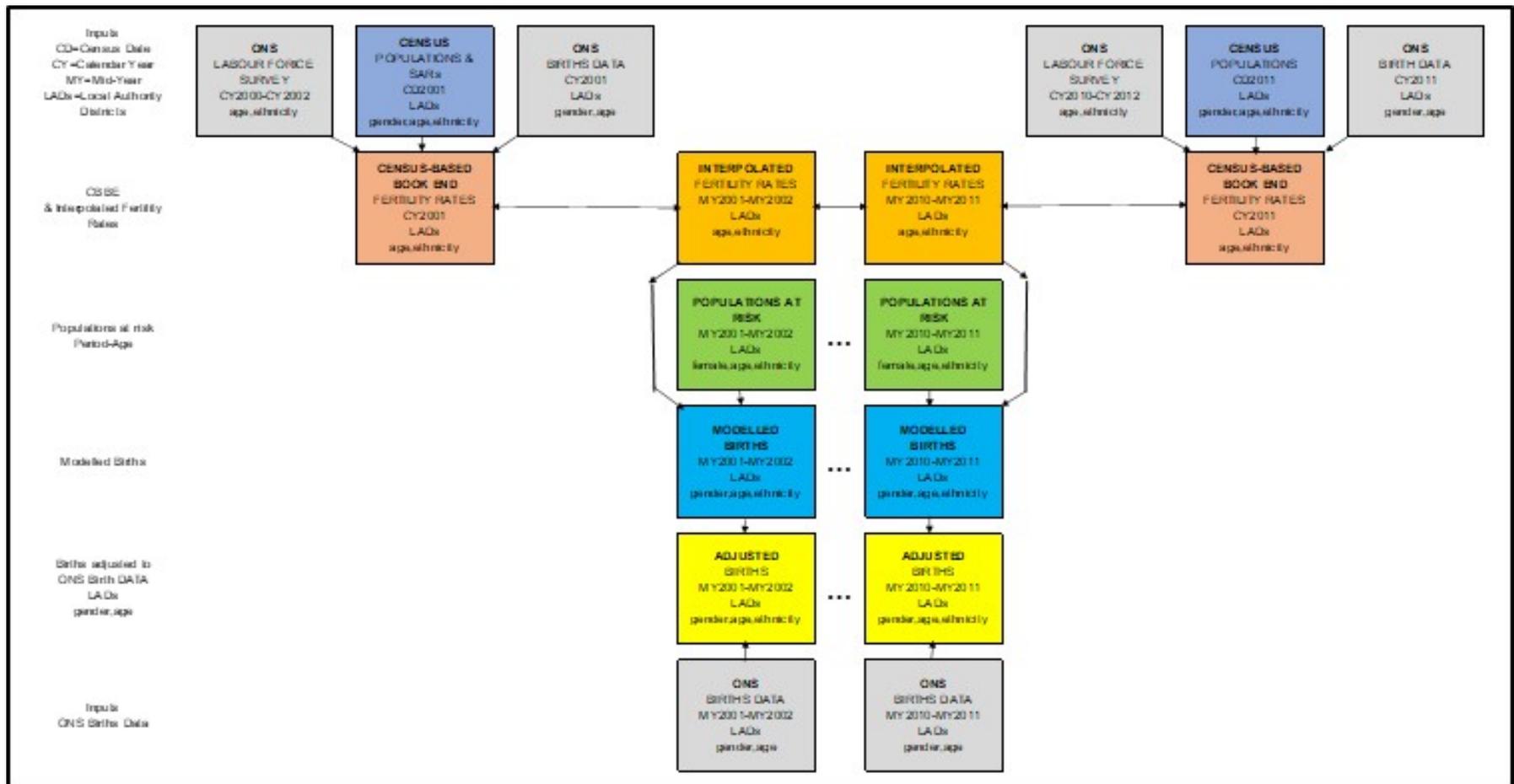
**Figure 21.3** Scheme for estimating ethnic-specific populations and PAR, mid-year 2001 to mid-year 2011

PAR=Population at risks for computing demographic rates

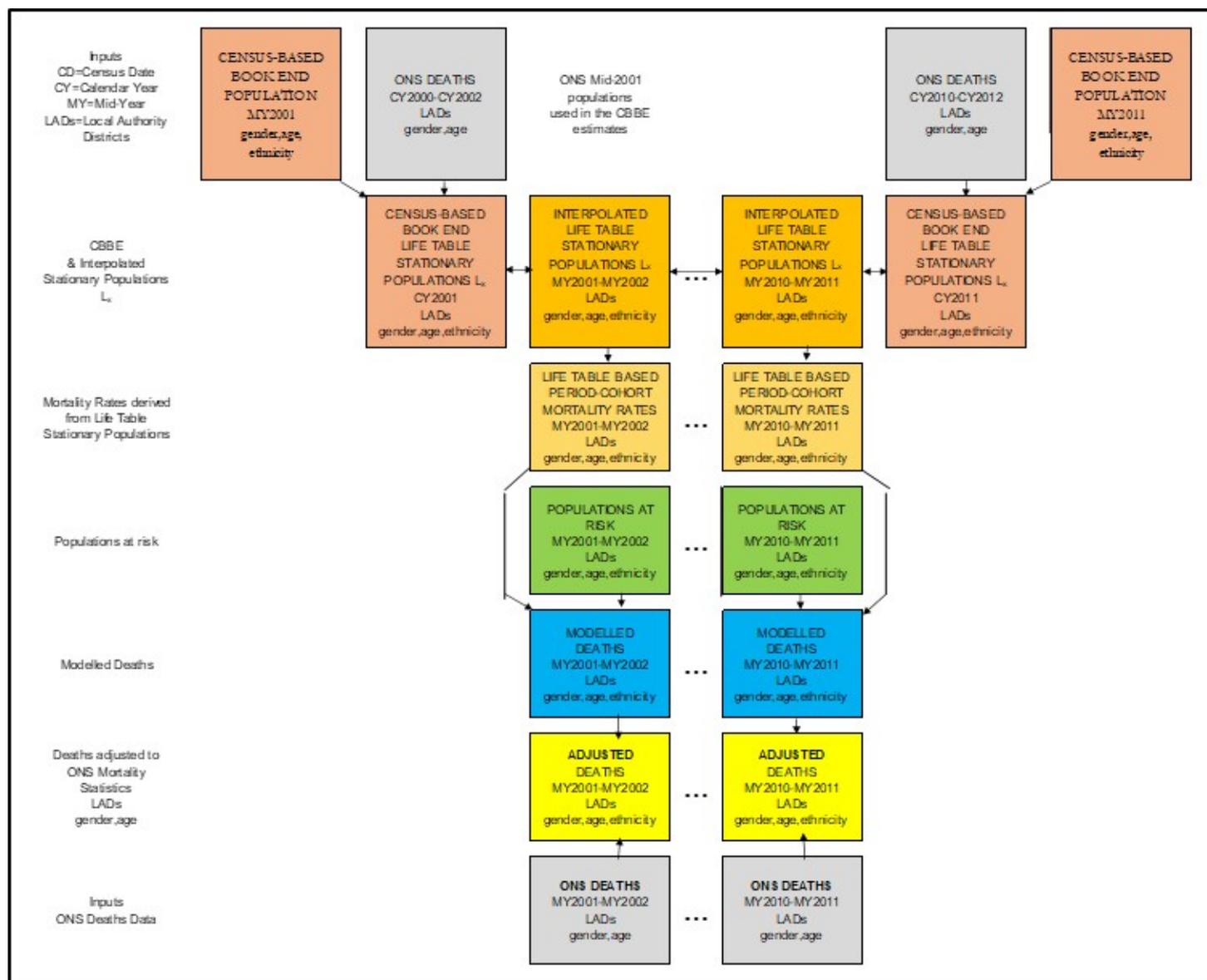


# 21.6 The estimation of ethnic components of change

**Figure 21.4** Scheme for estimating ethnic-specific fertility rates and births, mid-year 2001 to mid-year 2011



**Figure 21.5** Scheme for estimating ethnic-specific mortality, mid-year 2001 to mid-year 2011



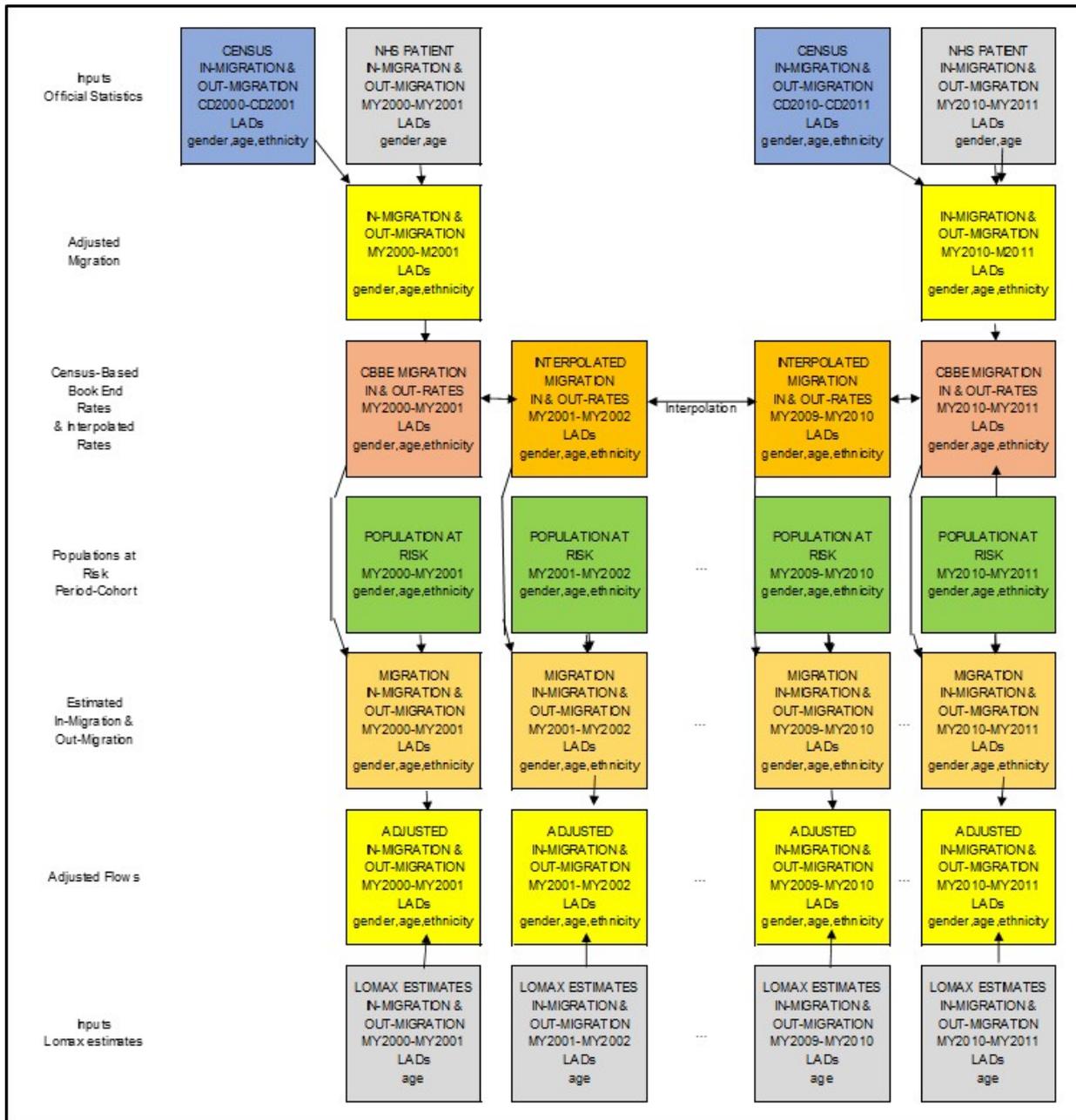
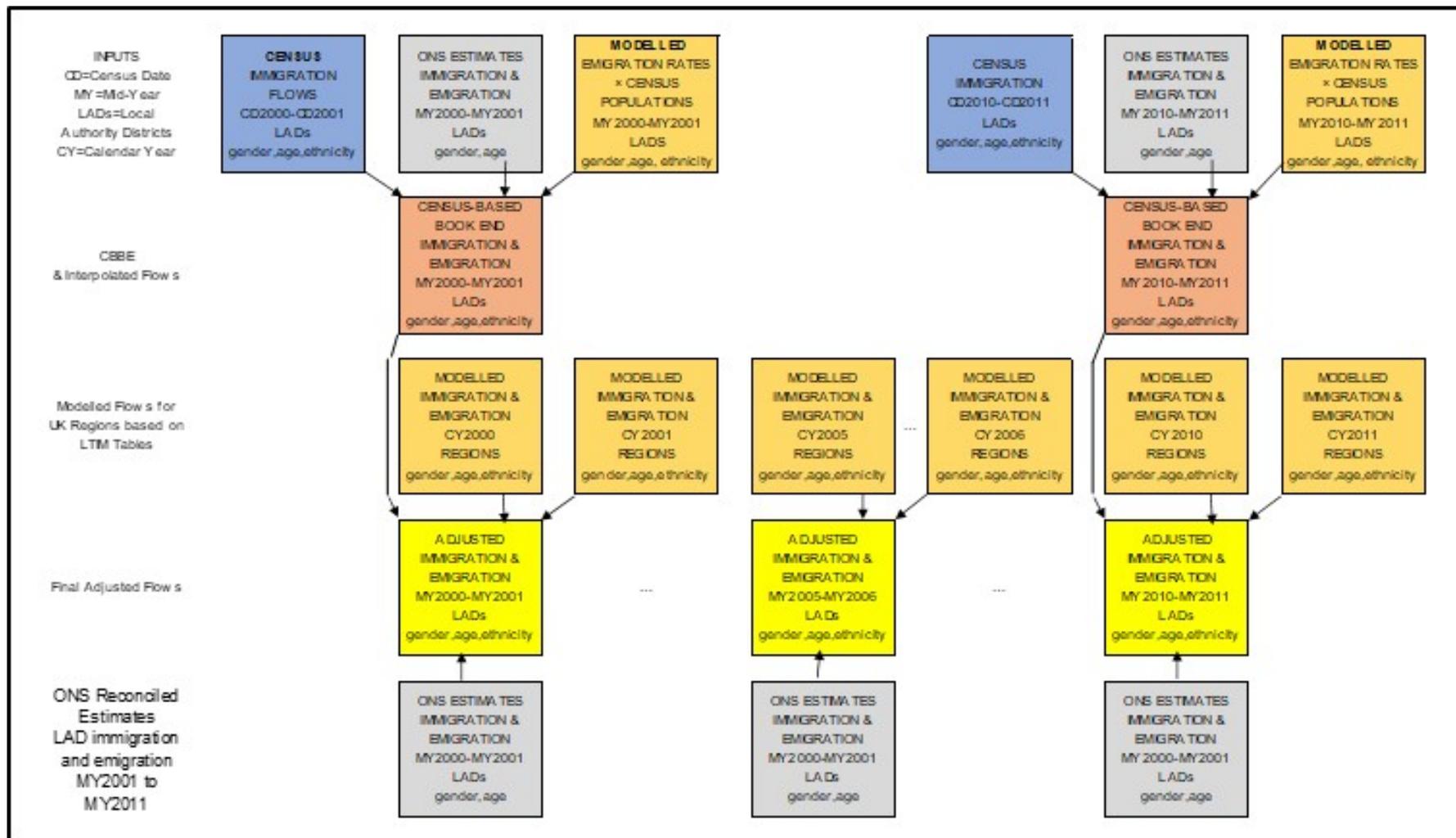


Figure 21.6  
Scheme for  
estimating ethnic-  
specific internal  
migration, mid-  
year 2001 to mid-  
year 2011

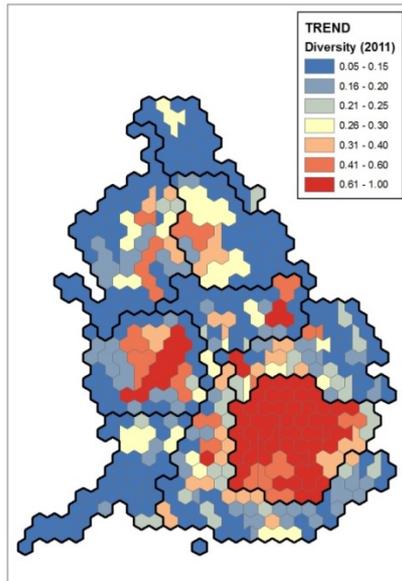
Figure 21.7 Scheme for estimating ethnic-specific international migration, mid-year 2001 to mid-year 2011



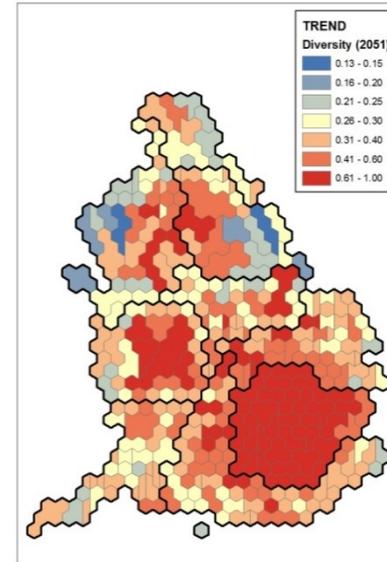


# The changing diversity of England's local populations

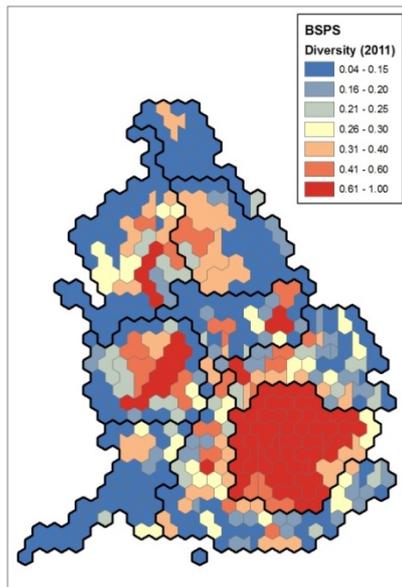
2001 Based,  
MY2011



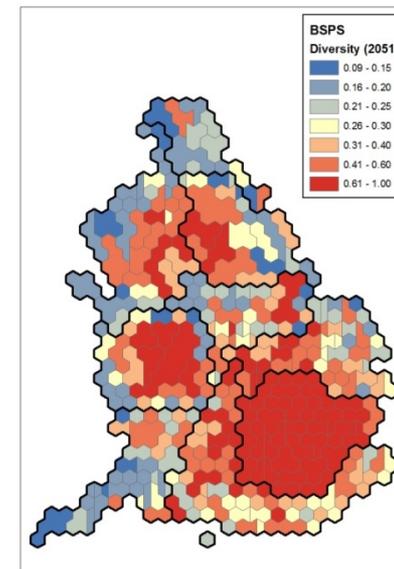
2001 Based,  
MY2051



2011  
Based,  
MY2011



2011  
Based,  
MY2051



## 21.8 Discussion and conclusions

- ❑ Using two censuses we have made **better estimates** of ethnic populations over the MY2001 to MY2011 decade.
- ❑ We have used the 2011 CBBE for populations, fertility rates, mortality rates, internal migration rates and international flows by ethnicity for local authorities as the **baseline or jump-off numbers** for projecting the UK population by ethnicity.
- ❑ The **internal migration assumptions** in particular have benefitted from availability of out-migration rates for ten mid-year to mid-year periods, to explore the influence of time period choice on future redistribution.
- ❑ Post 2011 estimates **not attempted** because we don't have (yet) a 2021 Census.
- ❑ Post 2011 populations and components are therefore the **outputs of our projection model** and so subject to the errors we saw in our 2001-based forecasts.
- ❑ Could we use post 2011 household **surveys** (LFS/APS) or **administrative data** to improve the rates we used for MY2011 to (say) MY2017? Possible at national and regional level but not at local level for ethnic sub-populations.
- ❑ Why is it **important to include ethnic detail** in our view of future populations? Come to Session 7C Energy & Water Demand to-morrow at 1400 to learn how ethnic populations have been used in *Forecasting Water Demand under Policy Scenarios for a UK Water Company*