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ARTICLE

# Population dynamics and ethnic geographies in Oslo: the impact of migration and natural demographic change on ethnic composition and segregation

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**Abstract** This paper explores demographic processes behind ethnic geographies in Oslo. We compare data for census tracts in 2001 and 2011, and decompose ethnic composition and segregation on local mobility, national migration, international migration and natural demographic change. The study comprises five national groups: Poles, Somalis, Sri Lankans, Iraqis and Pakistanis, plus aggregates for Nordic and non-Nordic residents. A key observation is that local mobility weakens the status of original settlements without a corresponding effect on levels of ethnic segregation. For several groups, local mobility increases both own-group exposure and separation from the Nordic majority. International migration, in contrast, increases spatial integration between Nordic and non-Nordic residents. Natural change accords with our expectation and strengthens both minority representation in established eastern settlements and ethnic segregation in Oslo at large. Certain features of the Oslo context, e.g. lack of multi-ethic experiences, domination of owner-occupied dwellings and redistributive policies, may explain the surprising results.

**Keywords** Ethnic segregation · Demographic events · Spatial mobility · Natural demographic growth

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## 1 Introduction

The study of ethnic residential segregation in Europe has evolved through distinct stages of refinement. Early research had to settle for group-level data and could thus describe levels of segregation and emergent ethnic geographies, but not the process by which individuals and households adapted to urban housing markets. A compilation of studies from 1991 is revealing in this respect: eight out of eight European cases relied on aggregate population statistics (Huttman et al. 1991). Some years later, a study from Paris showed how cohorts of immigrants moved in several directions within the region, both inwards and outwards (Bonvalet et al. 1995). Another contribution (Andersson 1998) argued that ethnic residential segregation is the result of selective migration, which in turn reflects processes across several geographical scales, and which requires observation of people over time. At this point, in the late 1990s, longitudinal research had its breakthrough. Studies of immigrant housing careers soon appeared in several countries (Clark and Drever 2000; Bolt and Van Kempen 2002; Magnusson Turner and Wessel 2013), along with research that explored native responses to increasing ethnic diversity (Andersson and Bråmå 2004; Bråmå 2006; Bolt et al. 2008), and research that opted for innovative methods in the study of residential differentiation. One new approach that received significant attention was to decompose residential changes on demographic categories (Simpson 2004; Simpson et al. 2008; Simpson and Finney 2009; Stilwell 2010; Bailey 2012).

This is the starting point for the present paper. Our aim is to explore the demographic processes behind ethnic geographies in Oslo, the capital of Norway, during the period 2001–2011. We address two associated questions: (1) How do demographic events, i.e. natural demographic change and various types of migration, affect ethnic composition in different districts of Oslo? (2) What is the impact of demographic events on levels of ethnic segregation? Accordingly, we only explore *one* set of determinants, without any link to segregation forces such as poverty, discrimination and preferences.

Differentiating several types of migration is a significant detail in the study. We separate between three types of movement: (1) local migration (within Oslo), (2) national migration (between Oslo and other municipalities in Norway) and (3) international migration (between Oslo and other countries). This refined division facilitates the interpretation of changes at all investigated levels—the neighbourhood level, the city district level and the city at large, where the city is defined at the municipal level.

Compared to previous research, we also apply a more detailed specification of groups. We gauge changes for the five largest national minorities—Poles, Pakistanis, Somalis, Sri Lankans and Iraqis—and for an aggregate of all residents with a non-Nordic background. The reference category throughout the analysis is Nordic background, which includes people from Norway, Denmark, Sweden, Finland, Iceland and the Faroe Islands. We thus adapt our analysis to the practical reality of cross-border contacts, political cooperation and massive cultural exchange. The Nordic countries make up a region with a common labour market and substantial internal homogeneity (Hilson 2011). Each country has its own language, but there are usually few language barriers. A fitting example is the inflow of young Swedes to Oslo. More than ten thousand individuals have arrived over the last decade, knowing that Swedish is fully acceptable to Norwegian employers.

Some words on terminology and concepts: we reserve the label ‘immigrants’ for persons who have immigrated themselves, and use ‘ethnic minorities’ for collectives of immigrants and descendants (i.e. children of immigrants who are born in Norway). Working with public statistics, we cannot claim to capture cultural or national identities, i.e. our reference to ‘Poles’ and ‘Pakistanis’ should be seen as convenient phrases.

Segregation implies that two or more groups live apart from each other, separated by physical space. We explore *two* aspects of segregation, evenness and 'own-group exposure', where evenness refers to differences in the distribution among neighbourhoods in a city, and own-group exposure to the degree of potential contact between members of the same subgroup, given their distribution across neighbourhoods (Massey and Denton 1988).

The next section presents some basic information regarding immigration and Oslo as a multi-ethic city. This is followed by a section that explores the link between demographic mechanisms and segregation. The third section describes our data and methods, followed by results and conclusions.

## 2 The formation of a multi-ethnic city

Immigrants from Asia and Africa started to arrive in Oslo around 1970, in a period of strong economic growth and liberal immigration regulations. At this point, only 3% of Oslo's residents were immigrants, the majority of whom came from European countries. The new 'guest workers' had travelled long distances, many from villages in Pakistan, India, Turkey and Morocco. In Oslo, they could easily get a job in low-paid services and small factories. Some years later, however, a rather different atmosphere arose. Slower growth, loss of manufacturing jobs and housing problems were important factors behind a new immigration law in 1975. This law effectively stopped immigration of unskilled migrants from poor countries, but it also opened up immigration for family reunification. Thousands of young males could now bring their families to Oslo, which in turn laid the foundation for thriving ethnic communities. A third shift occurred in the 1980s, when refugees from Chile, Vietnam and Iran arrived. This gateway remained open in the coming decades and brought groups from many new countries, e.g. Bosnia Herzegovina, Sri Lanka and Somalia, to Oslo. Equally important, Oslo was immediately included in the new space for circular migration that evolved after the millennium shift. A large group of Polish workers was soon followed by transnational commuters from Lithuania, Latvia, Russia and other east European countries. After years of circular mobility, there are now signs of more permanent settlement, particularly among the Poles.

It is not accidental that we refer partly to Oslo and partly to Norway. The formation of Oslo as a multi-ethnic city has occurred within the context of national regulations and policies. The Norwegian policy for diffusion of refugees and asylum seekers, which started in 1985, is particularly interesting. This policy has become more and more sophisticated and may have reduced the scale of secondary migration to Oslo over the last decade. For a long time, however, small- and medium-sized towns could not compete with the attraction of Oslo. Large numbers of refugees and asylum seekers migrated to Oslo and contributed to the growth of a multi-ethnic city (see Fig. 1). As of 2016, the proportion of immigrants and descendants is 33% and is increasing by 0.8 percentage points annually.

Within Oslo, early settlements were heavily concentrated in the inner city, particularly the eastern districts. Two decades on, the same pattern prevailed and had been reinforced by the growth of ethnic businesses. A breaking point for the original settlements came in the late 1990s, when more and more ethnic minorities moved to larger dwellings in the outer city. Most of these moves occurred within the eastern districts, whereas western suburbs remained a high-price area for Norwegians (Blom 2012; Wessel et al. 2017).

A key detail in the integration process concerns housing tenure. Oslo, like Norway, is dominated by owner-occupied dwellings, with few viable alternatives in the rental sector

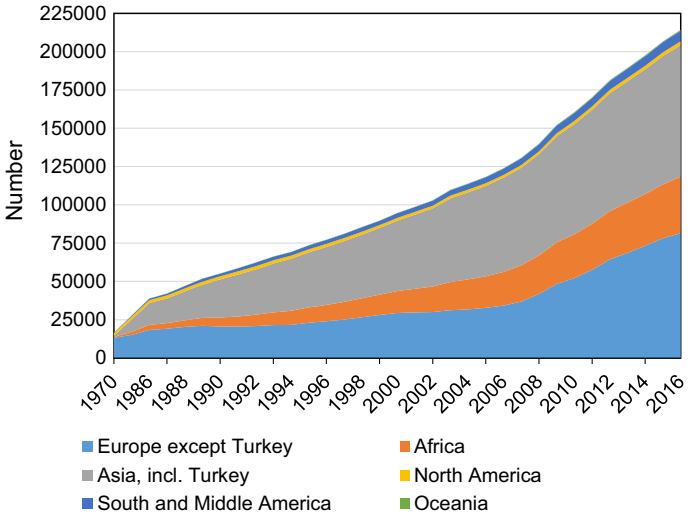


**Fig. 1** Number of immigrants and descendants in Oslo 1970–2016

(Magnusson Turner et al. 2015). Immigrants are to some extent propelled towards homeownership, particularly if they relocate from the inner city to a suburb. It is symptomatic that four out of the five national groups in this study have ownership rates above 45%.

A reasonable conclusion is that Oslo has reached a midway point in the settlement cycle of immigrant cities (cf. Simpson et al. 2008). Some groups have more than four decades of settlement, but the proportion of descendants is still small (31% for immigrants from Asia, Africa and Latin America).

## 3 Demographics and segregation

William Alonso once asserted that demographic behaviour is a key driver behind suburbanization, gentrification and the development of segregated cities. Without an understanding of demographics, there could be no understanding of urban form. According to Alonso, one could try to estimate future housing demand, but these estimates would hardly work if they were based on summary statistics: 'they do not tell us enough about the changing social and economic characteristics of the units which go to make up the aggregate' (Alonso 1980, p. 541).

The classic process of filtering illustrates Alonso's point. Particular districts or zones in a city may undergo changes that reflect average trajectories of people through time. High-income households trade up into high-quality housing and leave behind vacant housing for households with slightly lower income. The process continues down the housing hierarchy and produces quality conversions of the existing housing stock. A typical outcome is that immigrant areas decline in quality, whereas immigrant households follow an upward trajectory into better neighbourhoods. The latter adjustment, i.e. the process of spatial assimilation, is contingent on socioeconomic advances, acculturation and mastery of the majority's language (Massey 1985; Alba and Nee 2005).

Spatial assimilation theory has received substantial support in American research, although with great variations between groups (Alba and Nee 2005; Iceland and Scopilliti 2008). European studies are different in several respects, but tend to emphasize the same point: immigrants and descendants integrate through spatial mobility (Burgers and van der Lugt 2006; Zorlu and Mulder 2008; Simpson and Finney 2009; Bolt and Van Kempen 2010; Stilwell 2010; Macpherson and Strömgren 2013; Magnusson Turner and Wessel 2013; Schaake et al. 2014; Skifter Andersen 2016). Most of these studies describe a pattern whereby ethnic minorities diffuse from central neighbourhoods of poor quality to neighbourhoods of higher quality in the suburban ring. A second finding is that some ethnic groups are likely to face direct and indirect discrimination in the housing market. Supportive evidence of such practices has emerged in several countries, including Norway (Andersson et al. 2012). Other studies hesitate to draw a clear conclusion, suggesting that ethnic minorities fail to disperse due to discrimination, ethnic community preferences or both (Bolt and Van Kempen 2010; Schaake et al. 2014). Few scholars, however, maintain that continuous concentration is the dominating pattern.

Neither dispersal nor concentration can be viewed in isolation from native mobility. White flight, and to some extent white avoidance, has received attention in several European countries. Current research appears to support *two* major conclusions. Some studies point at group-based attitudes (Bolt et al. 2008; Van Ham and Clark 2009); other studies emphasize socioeconomic selection as a confounding factor in emergent ethnic geographies (Nordvik and Magnusson Turner 2015; Rathelot and Safi 2014). In addition, those who examine simultaneous inflows and outflows tend to consider avoidance as a more important mechanism than flight (Bråmå 2006; Kaufman and Harris 2015). For the present purpose, however, we need not concern ourselves with the finer details regarding prejudice and preferences, or the balance between inflows and outflows. What is important is the *net* effect of native mobility on local representation and city-level segregation. All available evidence suggests that such mobility matters for the development of segregated cities. In sum, considering all local movements, we therefore formulate the following hypothesis:

**H1** Net local mobility reduces: (a) ethnic minority presence in the inner east and (b) levels of ethnic segregation in Oslo at large.

National migration is a more intricate topic. Research in Britain shows that ethnic minorities tend to disperse from areas of high co-ethnic concentration (Finney and Simpson 2008). Britain, on the other hand, has two unique features: a long history of immigrant settlement and a high degree of urbanization. Countries with a shorter immigration history and a lower level of urbanization are likely to expect a different pattern of migration, in part because refugees relocate from smaller to larger cities. We have already noted that migration flows within Norway have been skewed towards Oslo, but also that these patterns have started to fade. Our expectation is that national migration, given the changing patterns, involves too much complexity to influence residential developments in Oslo:

**H2** Net national migration among all ethnic minorities has a trivial effect on: (a) ethnic minority presence in different districts and (b) levels of ethnic segregation in Oslo at large.

The next mechanism, immigration, is rooted in the structure of the urban economy and reinforced by population characteristics. Minority areas close to the central business district reflect three features of the industrial city: first, expensive means of transportation; second, a concentrated pattern of workplaces; and third, a large inflow of poor immigrants

(Massey, 1985). Post-industrial cities are far more diverse, but newly arrived immigrants may still gravitate towards older settlements. These places are often replete with ethnic retail outlets, amenities and institutions, which increase their attractiveness to newcomers. International migration may thus reproduce poverty and minority presence in particular areas, although with decreasing force as multi-ethnic cities mature (see Massey 1985; Simpson et al. 2008; Simpson and Finney 2009; Finney and Simpson 2009). In our case, there is no reason to expect a major change in the impacts of new arrivals. The central landscape of ethnic businesses and institutions remains intact, and many of the older groups continue to grow through family migration. From this follows our third hypothesis:

**H3** Net international migration increases: (a) ethnic minority presence in the inner east and (b) levels of ethnic segregation in Oslo at large.

Natural demographic growth, i.e. births minus deaths, is explored in three UK studies. The first one (Simpson 2004) shows that inner-city wards in Bradford became dominated by South Asian minorities during 1991–2001 due to age and fertility characteristics. A similar conclusion is reached in a study of South Asians in Rochdale and Oldham (Simpson et al. 2008) and is repeated in a study of seven minorities in the whole of Britain (Finney and Simpson 2009). The point, again, is that natural demographic growth counterweights and 'masks' an underlying tendency towards dispersal and spatial integration. These insights inspire our fourth hypothesis:

**H4** Natural demographic change increases: (a) ethnic minority presence in the inner and outer east and (b) levels of ethnic segregation in Oslo at large.

Looking beyond single mechanisms, we may also expect some differences between subgroups. A key determinant in this respect is duration of settlement, as proposed in several models. One recent proposition (Simpson et al. 2008) identifies eight stages of integration, spread over multiple generations, with tight connections between economic and demographic events: increasing spread over family stages reduces natural growth; increasing population size reduces immigration[1]; increasing economic participation reduces local clustering (i.e. the spatial assimilation effect); and increasing exposure to majority culture reduces secondary migration from smaller cities to metropolitan areas. In effect, as time passes changes within the groups will gradually open them up to a wider set of locational choices. As a simple deduction, we therefore expect a distinction between groups that arrived in the 1970s and 1980s ('older groups') and groups that arrived from the 1990s onwards ('younger groups'):

**H5** Demographic mechanisms produce an opposite pattern for older and younger groups: diffusion in the former case and concentration in the latter.

## 4 Data and methods

The analysis that follows is based on longitudinal data derived from several national registers, owned by Statistics Norway, the Directorate of Taxes and the Norwegian Labour and Welfare Administration. We explore changes in settlement and segregation between 1 January 2001 and 1 January 2011, counting individuals who lived in the municipality of Oslo at either point in time. Our first aim is to document changes in the distribution of

[1] This effect obtains because small populations have restricted markets for in-group spouses.

groups across four major districts—inner east, outer east, inner west and outer west. This analysis assesses the first part of hypothesis 1–4. Next, we undertake a formal analysis of segregation at the neighbourhood level, assessing the second part of hypothesis 1–4. Hypothesis 5 is considered in both sections.

The major districts reflect two classic segregation lines: one between east and west, which has been reproduced over more than 150 years, and one between inner and outer cities, which evolved after World War II (Kjelstadli 1990; Wessel 2000). As shown in Fig. 2, the outer west includes a township located east of the Oslo fjord. The township in question, Nordstrand, resembles the western part of Oslo in all socioeconomic and physical respects, in sharp contrast to the surrounding eastern townships.

We define neighbourhoods as census tracts, which is the standard choice in similar research (Blom 2012; Nordvik and Magnusson Turner 2015). One problem is that some tracts, e.g. on the outskirts of the city, are sparsely populated. We therefore eliminated all tracts with less than 50 inhabitants, amounting to 714 individuals in 2001 and 541 in 2011. The remaining data cover 504 tracts with an average population of 998 in 2001 and 1164 in 2011. The total number of inhabitants at these points was 507,782 (2001) and 596,023 (2011).

Our estimation of demographic events is straightforward. We measure 'local mobility' between census tracts within the municipality of Oslo and compare residential status at the two measurement points. 'National migration' is a rather mixed category, which includes moves between Oslo and the remainder of Norway, given that people lived in Norway on 1 January 2001. 'International migration' applies to immigrants who arrived in Norway after 1 January 2001, whether Oslo was the first city of residence or not, and emigrants who left Oslo during the 10-year interval. 'Natural change' is based on all registered births and

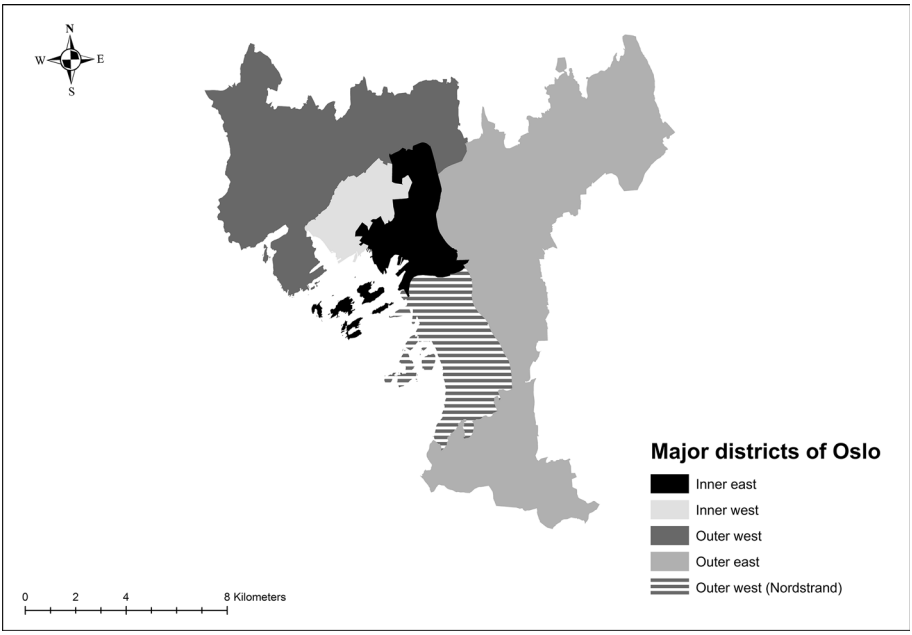


**Fig. 2** Major districts of Oslo

deaths, irrespective of local and national moves between 2001 and 2011. This implies that births may have taken place in other Norwegian municipalities, but not abroad.[2]

Residents of foreign origin in Norway are defined by national background (country of origin), type of entry (gateway) and nativity (generation). We apply national background and nativity, without further distinctions between immigrants and descendants.

### 4.1 Segregation measures

We follow standard practice and measure evenness by the dissimilarity index ($D$) and own-group exposure by the isolation index ($P^*$). $D$ is commonly interpreted as the percentage of a subgroup that has to move to a different neighbourhood in order to produce a uniform distribution of the group. $P^*$ expresses the probability that a minority member might meet someone else from the same minority group in the neighbourhood, summed up across all neighbourhoods in the city. Both indices vary between 0 (complete integration) and 100 (complete segregation) and depend on the size of the neighbourhoods. $P^*$, contrary to $D$, also depends on the size of the minority group.

### 4.2 Implications for hypotheses

$P^*$'s sensitivity to group size suggests a modification of hypothesis 3: international migration should increase $P^*$ more than $D$. We would not be surprised if a similar tendency obtains for natural growth, but this requires that natural growth remains important after groups have spread from original settlements. The model proposed by Simpson et al. (2008), and their own research as well, emphasizes that natural growth *decreases* as part of the integration process, which implies that $D$ and $P^*$ will converge. $D$ and $P^*$ should also converge in our measurement of local and national mobility. There is no obvious connection between group size at the city level and rates of mobility at the neighbourhood level, nor between group size and the direction of movements. Likewise, there are no clear-cut implications for older and younger groups. What we can expect, perhaps, is a large degree of complexity for older groups that continue to grow. These groups may experience *decreasing* segregation in terms of evenness and *increasing* segregation in terms of own-group exposure.

## 5 Population changes at the district level

Table 1 shows how various changes in the seven groups play out in the four districts. A general impression is that demographic events strengthen minority representation in the eastern suburbs. The share of the non-Nordic population residing in the outer east increased by 2.8% points, which corresponds to 40,000 inhabitants. This happened despite a substantial over-representation in 2001 and despite an *opposite* pattern in the large Polish group. Poles experienced a distinct redistribution away from the outer east, towards more popular areas in the outer west and the inner east. Even Somalis lost a large share in the outer east, but this group did not expand beyond the east–west border. Finally, we see that Sri Lankans, Iraqis and Pakistanis became more concentrated in the outer east. All of them

[2] Most of the births took place in Oslo (77%) or surrounding municipalities (18%). Similarly, 96% of all deaths occurred in Oslo and another 2% in the surrounding municipalities.

**Table 1** Distribution of seven subgroups on major districts in Oslo, 2001 and 2011

| Group | Inner east | Outer east | Inner west | Outer west | Total | Share of all | *N* |
|---|---|---|---|---|---|---|---|
| *Total population* | | | | | | | |
| 2001 | 17.9 | 43.4 | 13.5 | 26.2 | 100.0 | | 507,782 |
| 2011 | 18.5 | 42.1 | 13.6 | 25.8 | 100.0 | | 596,023 |
| *Nordic background* | | | | | | | |
| 2001 | 15.2 | 40.1 | 14.5 | 29.3 | 100.0 | 89.1 | 421,800 |
| 2011 | 17.9 | 36.7 | 15.1 | 30.2 | 100.0 | 74.6 | 444,875 |
| *Non-Nordic background* | | | | | | | |
| 2001 | 25.1 | 55.2 | 8.6 | 11.0 | 100.0 | 16.9 | 85,982 |
| 2011 | 20.3 | 58.0 | 9.2 | 12.5 | 100.0 | 25.4 | 151,148 |
| *Poles* | | | | | | | |
| 2001 | 17.3 | 52.3 | 11.9 | 18.5 | 100.0 | 0.3 | 1661 |
| 2011 | 23.6 | 41.3 | 11.7 | 23.4 | 100.0 | 1.7 | 10,316 |
| *Somalis* | | | | | | | |
| 2001 | 30.5 | 59.5 | 5.2 | 4.7 | 100.0 | 0.9 | 4795 |
| 2011 | 37.6 | 49.5 | 6.5 | 6.4 | 100.0 | 2.0 | 11,950 |
| *Sri Lankans* | | | | | | | |
| 2001 | 15.8 | 80.4 | 1.6 | 2.1 | 100.0 | 1.0 | 5228 |
| 2011 | 6.4 | 90.8 | 0.9 | 1.9 | 100.0 | 1.2 | 7190 |
| *Iraqis* | | | | | | | |
| 2001 | 37.6 | 48.8 | 5.7 | 7.9 | 100.0 | 0.6 | 2843 |
| 2011 | 23.6 | 66.4 | 4.1 | 5.9 | 100.0 | 1.2 | 6999 |
| *Pakistanis* | | | | | | | |
| 2001 | 27.6 | 66.1 | 2.6 | 3.8 | 100.0 | 3.5 | 17,590 |
| 2011 | 13.6 | 81.9 | 1.3 | 3.3 | 100.0 | 3.6 | 21,545 |

lost shares in the remaining city and ended up with high figures in the outer east − 91% for the Sri Lankans, 66% for the Iraqis and 82% for the Pakistanis.

Table 2 gives a detailed outline of how population dynamics shape ethnic geographies in the four districts. The numbers add up to a total increase or decrease, which obviously improves the visibility of large and older groups. We may note, in addition, that internal mobility is an aggregate of two-way flows between the districts (relative numbers can be obtained from the first author).

The results for the inner east conform in several respects to the ecological model of neighbourhood change. Oslo's inner east is a place of huge inflows and outflows, with local as well as national and international connections. If we look at net international migration for people of non-Nordic background, we find that the inner east gained more than 10,000 individuals, but lost more than 5000 through local mobility. An even larger net influx to the inner east, close to 15,000 individuals, occurred through national mobility among Nordic residents. The latter inflow consisted largely of young adults, as noted in several previous studies (e.g. Stambøl 2013).

The unstable character of the inner east district is far from new. Several older studies have described the area in similar terms—for instance, as a 'transit harbour' (Gulbrandsen

**Table 2** Components of population change in four districts of Oslo, 2001–2011 (values are rounded to 50)

| Group | Inner east | Outer east | Inner west | Outer west | Total |
|---|---|---|---|---|---|
| *Nordic background* | | | | | |
| Net local mobility | − 1900 | 2300 | − 3100 | 2800 | |
| Net national mobility | 14,950 | − 12,150 | 9200 | 1150 | 13,150 |
| Net international migration | 1600 | − 1200 | 550 | − 1600 | − 650 |
| Natural change | 0 | − 550 | − 1650 | 5350 | 3150 |
| Population change | 14,400 | − 11,850 | 4850 | 7550 | 14,950 |
| *Non-Nordic background* | | | | | |
| Net local mobility | − 5250 | 6150 | − 650 | − 250 | |
| Net national mobility | 950 | 500 | 500 | 300 | 2250 |
| Net international migration | 10,300 | 20,700 | 6000 | 8350 | 45,350 |
| Natural change | 2750 | 11,050 | 500 | 650 | 14,950 |
| Population change | 8600 | 38,150 | 6300 | 9000 | 62,050 |
| *Poles* | | | | | |
| Net local mobility | 0 | 0 | 0 | 0 | 0 |
| Net national mobility | 50 | − 50 | 50 | 0 | 50 |
| Net international migration | 2000 | 3300 | 900 | 2000 | 8200 |
| Natural change | 50 | 150 | 50 | 100 | 350 |
| Population change | 2100 | 3400 | 1000 | 2100 | 8600 |
| *Somalis* | | | | | |
| Net local mobility | 100 | − 250 | 50 | 0 | |
| Net national mobility | 550 | 550 | 100 | 100 | 1300 |
| Net international migration | 1200 | 1400 | 250 | 250 | 3100 |
| Natural change | 1150 | 1300 | 150 | 200 | 2800 |
| Population change | 3000 | 3000 | 550 | 550 | 7100 |
| *Sri Lankans* | | | | | |
| Net local mobility | − 350 | 350 | 0 | 0 | 0 |
| Net national mobility | − 50 | 100 | 0 | 0 | 50 |
| Net international migration | 0 | 550 | 0 | 0 | 550 |
| Natural change | 50 | 1150 | 0 | 0 | 1 200 |
| Population change | − 350 | 2150 | 0 | 0 | 1 800 |
| *Iraqis* | | | | | |
| Net local mobility | − 350 | 400 | − 50 | − 50 | |
| Net national mobility | 200 | 500 | 50 | 0 | 750 |
| Net international migration | 400 | 1300 | 100 | 150 | 1950 |
| Natural change | 350 | 1000 | 50 | 50 | 1450 |
| Population change | 600 | 3200 | 150 | 150 | 4100 |
| *Pakistanis* | | | | | |
| Net local mobility | − 1900 | 2100 | − 150 | − 100 | |
| Net national mobility | − 350 | − 1000 | − 50 | − 50 | − 1450 |
| Net international migration | 100 | 1900 | 0 | 100 | 2100 |
| Natural change | 150 | 2200 | 0 | 50 | 2400 |
| Population change | − 2000 | 5200 | − 200 | 0 | 3000 |

and Torgersen 1987). A major flow in those days consisted of Norwegians who moved to new dwellings in the expanding eastern suburbs. The corresponding flow nowadays is different in two important respects: Norwegians comprise a minority of the movers, and the available dwellings are seldom newly built. A third novel aspect which is shown in Table 2 is the succession of immigrant groups. Pakistanis and Sri Lankans have tiny inflows through net international migration; for Sri Lankans, there is no supplement at all. Younger groups, by contrast, tend to use the inner east as a springboard for further adjustment. Younger groups also replace older groups through natural growth, as we see from the huge difference between Pakistanis and Somalis: 150 compared to 1150 residents.

Turning to the outer east, a rather different picture emerges. This area is a key destination for ethnic minorities who leave the inner city, although with great variation across groups. Poles had a balanced exchange with the remaining city; Somalis lost a few hundred; Sri Lankans gained a few hundred; and Pakistanis gained around 2100 residents. Pakistanis even gained through international migration, just like all minority categories in Table 2. The net effect of international migration for people of non-Nordic background is astounding—around 20,700 individuals, which make up 54% of total growth in the outer east. The Nordic majority, on the other hand, *lost* a substantial share through international migration, and even more so through national migration. This observation accords with research showing that Norwegians and people from neighbouring countries eschew the outer east (Wessel 2017).

The western districts have a continued history of middle and upper-class settlement. It is therefore not surprising that *none* of the national groups in Table 2 makes a discrete transition from east to west. Some of the groups, and even the non-Nordic category, increase their presence in the western sector, but this happens through international migration and natural growth. One intriguing feature is a *direct* flow between Poland and the western sector, obviously driven by expanding economic activities. The net effect of the flow, compared to a situation with zero net migration, is to boost the number of Polish residents in the western sector by 2900. A weak effect in the same direction obtains for Somalis and Iraqis.

Looking across the districts, we note that international migration is the largest contributor to change. Natural growth counts a lot in the eastern sector, but not in the western sector. Migration flows between districts in Oslo and across the Oslo border are moderate in size for the non-Nordic group, and even for Poles, Somalis, Sri Lankans and Iraqis. These flows are, on the other hand, relatively large in the Nordic majority. People of Nordic origin are drawn to *three* districts (inner east, inner west and outer west) and shy away from the fourth (outer east). We thus get an indication that all our chosen demographic categories affect levels of segregation. Hypothesis 1 regarding ethnic minority presence in the Oslo inner east is supported for three out of five national groups, plus for the aggregate category of non-Nordic residents. There is also clear support for hypothesis 2, since national mobility among ethnic minorities is the least important mechanism and appears to reproduce levels of representation in the four districts. Hypothesis 3 is supported as well: international migration increases ethnic minority presence in the inner east. Hypothesis 4 pointed to natural demographic growth in the inner and outer east, with no distinction between the two. What we discovered is that the inner east is completely eclipsed by the outer east as the key area for non-Nordic families with children. Hypothesis 5 regarding older and younger groups is more difficult to assess, but some additional calculations contradict the hypothesis. The two oldest groups, Pakistanis and Sri Lankans, did not increase their representation in the western sector. Poles, on the other hand, improved their representation in that sector.

### 5.1 Impact of various demographic events on levels of segregation

We will now undertake a series of calculations to illustrate how migration and natural demographic change affect levels of segregation. Our exercises are anchored in the distribution of the Nordic population over the neighbourhoods of Oslo in 2011. That is, we keep the distribution of Nordic residents constant across all calculations, looking at four counterfactual situations:

1. Levels of segregation without local mobility in the non-Nordic groups.
2. Levels of segregation without net national migration of non-Nordic groups.
3. Levels of segregation without net international migration of non-Nordic groups.
4. Levels of segregation without birth surplus/deficit of non-Nordic residents.

The outcomes of these measurements are presented in Table 3, with $P^*$ in the upper half and $D$ in the lower half. Two rows present crude values for each group, followed by detailed calculations for step 1–4.

It is unsurprising that $P^*$ rose substantially from 2001 to 2011, given the construction of this index. The question is how a $P^*$ value of 37.4 for a subgroup with 25.4% of the population (2011) compares to a value of 28.1 when the group comprised 16.9% of all residents (2001). One technical suggestion is to calculate 'overexposure' as the $P^*$-value divided by the share of the group (Bayer et al. 2004). If we do that, we see that non-Nordic residents experienced a slight growth in overexposure. A further inspection of the counterfactuals reveals that neither net local mobility nor net national migration contributed to changes. The main contributing factors were, instead, net international migration and

**Table 3** Index of isolation and dissimilarity for Oslo measured at census tract level: the effects of demographic events on segregation of six subgroups over the period 2001–2011

| | Non-Nordic | Group | | | | |
|---|---|---|---|---|---|---|
| | | Poles | Somalis | Sri Lankans | Iraqis | Pakistanis |
| *Isolation index* | | | | | | |
| $P^*$ 2001 | 28.1 | 0.9 | 5.3 | 10.6 | 7.6 | 19.4 |
| $P^*$ 2011 | 37.4 | 6.1 | 11.0 | 11.1 | 6.4 | 19.8 |
| $P^*$ 2011 without net local mobility | 37.4 | 6.1 | 10.4 | 12.5 | 6.8 | 18.6 |
| $P^*$ 2011 without net national mobility | 37.4 | 6.1 | 9.9 | 11.1 | 5.7 | 20.6 |
| $P^*$ 2011 without net international migration | 33.2 | 0.8 | 8.4 | 10.4 | 5.5 | 18.3 |
| $P^*$ 2011 without natural change | 34.5 | 6.0 | 8.7 | 9.2 | 4.8 | 17.8 |
| *Dissimilarity index* | | | | | | |
| $D$ 2001 | 38.5 | 36.5 | 57.5 | 66.4 | 56.4 | 55.3 |
| $D$ 2011 | 37.4 | 30.3 | 56.4 | 69.1 | 54.4 | 61.0 |
| $D$ 2011 without net local mobility | 37.4 | 30.7 | 56.0 | 69.2 | 53.1 | 57.6 |
| $D$ 2011 without net national mobility | 37.8 | 30.6 | 56.4 | 69.2 | 54.4 | 61.0 |
| $D$ 2011 without net international migration | 41.8 | 29.8 | 56.8 | 69.1 | 53.7 | 60.4 |
| $D$ 2011 without natural change | 35.8 | 30.4 | 56.0 | 68.6 | 52.8 | 60.4 |

natural demographic change within the group. Zero net international migration and zero natural change would have lowered $P^*$ by 4.2, respectively, 2.9% points.

When considering own-group exposure within each of the country groups, some interesting patterns emerge. Among the Poles, the whole increase in the exposure measure is due to international migration. In fact, when abstracting from net international migration, the exposure of Poles to Poles in Oslo decreased from 2001 to 2011, albeit only slightly. Like the Polish group, the Somali and the Iraqi groups grew strongly in relative terms. However, while $P^*$ among Somalis more than doubled, that of Iraqis declined by 1.2% points. For the Somalis, all demographic factors worked in the direction of higher own-group exposure, with the strongest contribution from net international migration and natural change.

The Pakistanis and the Sri Lankans are, as noted, the two oldest groups. Given this background, the evolution of own-group exposure and a breakdown of the changes is clearly of interest. Both groups experienced a growth in own-group exposure that contributed to increasing overexposure. The magnitude of the growth, however, was quite small. Looking at demographic events, we note an interesting difference: net local mobility lowered own-group exposure for the Sri Lankans, while the opposite happened for the Pakistanis. A common feature for both groups is that net international migration and natural change boosted own-group exposure. The explanation of this is rather trivial. Immigration is driven by family unification, often by marriage to a spouse from the country of origin (The Government 2011). Hence, both immigration and natural change are events where new family members are added to existing households. Obviously, this increases mean own-group exposure.

Turning to measures of evenness, we first note that non-Nordic ethnic minorities experienced slightly decreasing segregation between 2001 and 2011, largely due to net international migration. Natural change worked in the opposite direction and raised $D$ from 35.8 to 37.4. We further note that Poles are the least segregated of the six groups. Despite a significant immigration of Poles to Oslo, the level of segregation for this group did not rise, but declined. The aggregate result of all four events is quite substantial—a reduction in $D$ from 36.5 to 30.5.

Levels of $D$ for Sri Lankans and Pakistanis grew between 2001 and 2011, in both cases from an already high level. We note here that most effects from demographic events are trivial, with two notable exceptions. First, net local mobility contributed to increased segregation of Pakistanis; without local mobility, the $D$ value would have been 57.6, compared to the current value 61.0. Second, the results indicate that natural change contributed to a minor reduction in the segregation of Sri Lankans.

The two remaining groups, Somalis and Iraqis, experienced marginal changes. Most of the demographic events had a trivial effect on $D$ for the former group, whereas net local mobility and natural growth contributed to an increased $D$ for the latter group.

We thus end up with a combination of expected and unexpected results. Hypothesis 1 received some support through the analysis of minority presence in different districts: Oslo inner east lost a large number of non-Nordic residents through net local mobility. What we have discovered in the latter analysis, however, is that most groups retained the same level of segregation, whereas one group, Pakistanis, moved to areas with greater exposure to other Pakistanis as well as greater separation from Nordic residents. The group from Sri Lanka displayed a weak tendency towards integration with other non-Nordic minorities, but retained its high level of separation from the Nordic group. Hypothesis 1 is therefore weakened: we cannot confirm that local mobility reduces the level of ethnic segregation in Oslo at large. Hypothesis 2, on the other hand, receives substantial support. National

migration had little effect on ethnic segregation for most groups, including the large non-Nordic aggregate. One notable exception here is a tendency towards increasing own-group exposure for Somalis and Iraqis, probably because these young groups experienced secondary migration from initial settlements. Hypothesis 3 was supported in one part of the analysis—net international migration raised the level of $P^*$. We expected a weaker effect in the same direction for $D$, since $D$ is unaffected by group size, and since theory suggests that immigrants cluster in areas that provide co-ethnic contact and support. What we found, however, was that new arrivals *lowered* the level of separation for most groups, with a large net effect for the non-Nordic aggregate. Hypothesis 4 was clearly supported: natural demographic change boosted levels of ethnic segregation, although we observed a neutral pattern for some of the groups. Finally, we could not discover the expected patterns for older and younger groups. Two of the oldest groups, Pakistanis and Sri Lankans, became more concentrated during 2001–2011, whereas the youngest group, the Poles, became more dispersed. Hypothesis 5 is therefore contested, although on a thin empirical basis. It would be interesting to see whether older groups with a more stable population size have a different pattern, in line with our discussion of segregation measures.

## 6 Discussion

We have explored the demographic processes behind ethnic geographies in Oslo. The large influx of immigrants over recent decades serves as an important background for the study. While Oslo makes up the frontier of new immigration to Norway, it is not a 'mature' immigrant city where different ethnic groups have adjusted to each other over generations. One relevant comparison in this respect is the Norwegian minority in New York. It took more than half a century from the formation of 'Little Norway' in Brooklyn until Norwegians started to disperse in the New York landscape (Hoover 1970). The contained form of the Norwegian settlement in New York suggests, firstly, that three to four decades may be too short to expect large-scale spatial assimilation, and, secondly, that ethnic segregation in Norway plays out in a distinct context. Norwegian cities do not have rich multicultural experiences, and Norway as a country is still in a phase of fast urbanization, with a dominant rural mentality. These features imply that native behaviour may be a key component behind the picture we have painted in this article. Native Norwegians are prone to leave multi-ethnic areas for many reasons, some of which have little to do with intergroup relations. A strong preference for single-family houses is just one such factor (Wessel 2017).

A related point concerns the ownership bias in Norwegian housing policy. Several arrangements facilitate access to homeownership, such as the Norwegian State Housing Bank's 'start-up mortgage'. A large share of immigrants and descendants have benefitted from these arrangements and have been able to buy their own home and pursue a housing career in the eastern sector (Magnusson Turner and Wessel 2013; Wessel et al. 2017). Since many groups accept high-density living, and since the eastern sector has become a 'home territory', they seldom cross the border between east and west. Living as homeowners in Oslo east gives them the opportunity to profit from property value appreciation.

Spatial assimilation is, of course, also a question of neighbourhood quality. The eastern sector of Oslo does indeed suffer from social and economic problems, but these problems are not reflected in poor public services. Eastern townships are compensated through a city-wide allocation system, additional school resources and area-based programmes. These

efforts are bound to affect local mobility and may reduce the relevance of spatial assimilation theory.

The two remaining mobility components, national and international migration, are closely related to each other. Perhaps the most important point is that refugees and asylum seekers receive more training and supervision than previously. A specific payment for participation, which complements social assistance, increases the motivation to stay in smaller- and medium-sized towns. Refugees have also been spread evenly between townships in Oslo, as a predetermined share of the total population (Oslo Municipality 2017). Integration policy is therefore a likely factor behind the surprising effect of international migration. A third point is that labour migrants from Eastern Europe, particularly Poles, have more socioeconomic resources than immigrants from Asia and Africa. With this background, they often seek out places with higher socioeconomic status. As mentioned above, they also converge towards parts of the city that can offer relevant work. Fourth, many newcomers are obviously unable to cope with the price level in Oslo, particularly the inner city. Access to cheaper housing may steer these groups towards peripheral locations inside and outside of the Oslo region. A final point concerns the nature of transnational connections. Some national groups appear to change in terms of socioeconomic and demographic profile, partly as a reflection of economic development in the country of origin. The Indian minority in Oslo is a case in point. This group started to arrive in Oslo in the 1970s, and consisted of poor labour migrants who clustered in the eastern sector. Recent arrivals, in contrast, include many professionals, who often prefer the western part of Oslo (Wessel 2017).

The results pertaining to natural change are less surprising. We observe basically the same pattern as Finney and Simpson (2009): a connection between family formation and growing ethnic segregation. Like Finney and Simpson, we expect that this connection will attenuate as a function of increasing demographic diversity, e.g. increasing spread over family stages, and declining fertility rates.

In summary, our paper demonstrates the richness of segregation experiences across Europe. It also highlights the potential for mechanism-oriented research. We have explored some demographic mechanisms, but our approach is only one among many options. One important task is to advance the analysis of international migration. We have suggested that several factors, including integration policy and change in the composition of labour migrants, explain the attenuating effect of new arrivals. It remains to see whether these proposals are supported by evidence, and whether factors such as family reunifications and new family establishments work in the opposite direction. Another promising extension would be to investigate the relationships between age structure, gender, demographic mechanisms and settlement changes. And, of course, one might flip the perspective in this study and see how demographic events among Nordic residents affect dissimilarity and exposure measures.

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