

**The struggle to belong**  
***Dealing with diversity in 21st century urban settings.***

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**Living with Difference:**  
**Mapping Diversity in Leeds and Warsaw**

**Aneta Piekut**

School of Geography, University of Leeds, Leeds LS2 9JT, United Kingdom  
[a.piekut@leeds.ac.uk](mailto:a.piekut@leeds.ac.uk)

**Philip Rees**

School of Geography, University of Leeds, Leeds LS2 9JT, United Kingdom  
[p.h.rees@leeds.ac.uk](mailto:p.h.rees@leeds.ac.uk)

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**Abstract:** Communities across the world are becoming more diverse because of international migration, population ageing, residential mobility and life style choices. This paper aims to understand social diversity and various opportunities to encounter diversity in an urban context. In doing so, we prepared a description of the diversity residential communities of two cities, Leeds and Warsaw, using census data (UK 2001, Poland 2002). We used selected variables to represent in both cities the key social dimensions of difference: demographic, socio-economic, ethnic and disability. A standard cluster analysis using a k-means algorithm was implemented for each city separately and for the two cities combined. We selected 8 cluster solutions for each city which have different profiles and spatial distributions. A combined cluster analysis showed that there was little overlap in community types across the two cities. Leeds and Warsaw residents experience very different opportunities to encounter difference.

**Keywords:** diversity, cluster analysis, Leeds, Warsaw

## Introduction

Societies have always been diverse. However, the twentieth century witnessed an increase of international mobility and diversification of migration (Castles and Miller, 1998). At the same time the recognition of rights of different minority groups (e.g. women, ethnic minorities, sexual minorities and disabled people) and the development of internationally agreed human rights have led to an increase in the perception that contemporary societies are socially and culturally diverse. On the one hand, thanks to more intense international migration, *people with different backgrounds more often than in the past live in the same residential spaces*, creating opportunities for inter-group encounters. On the other hand, *people are much more aware that other people are different*, not only in terms of social class or ethnicity. Therefore, in the paper we shift the discussion on diversity from exclusive, minority thinking to inclusive thinking about the whole society.

By diversity we mean the degree to which communities are comprised of different populations. Diversity is a function of the number of groups that live in an area and the distribution of the population across these groups. We employ here a broad understanding of difference to encompass differences in age, sexuality, ethnicity, religion, socio-economic status and in degrees of (dis)ability. Moreover, these various dimensions of difference constitute the agenda of the UK's Equality and Human Rights Commission, the Equality Act that came into force on 1<sup>st</sup> January 2011 in Poland<sup>1</sup> and are also part of the Treaties on European Union and the Functioning of the European Union that established the ground rules for equal and non-discriminatory treatment (Official Journal C 83 of 30.3.2010)<sup>2</sup>.

The aim of this paper is to map multidimensional social diversity in the two European cities – Leeds and Warsaw. The mapping exercise is undertaken in two steps. First, we present one-dimensional diversity maps, i.e. the spatial distributions of people of different ages, occupations, ethnicities and disability in both cities. Secondly, we wanted to produce typologies of communities that would vary in terms of diversity patterns. We aimed to obtain community types that would be similar or different in the diversity dimensions that we have specified. Finally, we aimed at diversity types of communities that could be used as strata to control samples used in a survey on attitudes towards diversity in Leeds and Warsaw.

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<sup>1</sup> Equality laws and institutions have been established in Poland later than in many European countries. The Equality Act came into force on 1<sup>st</sup> January 2011 and the Commissioner for Protection of Civil Rights (*Rzecznik Praw Obywatelskich*) has become the first port of call in case of discrimination. The Racism and Xenophobia Monitoring Group (*Zespół Monitorowania Rasizmu i Ksenofobii*) works under the auspices of Ministry of Internal Affairs and Administration. Additionally, there is also a Government Commissioner for Equal Treatment who also monitors discrimination by age, gender, religious, nationality or sexual orientation.

<sup>2</sup> Two main directives define the principles to be used: The *Racial Equality Directive* (2000/43/EC) against discrimination on grounds of race and ethnic origin and The *Employment Framework Directive* (2000/78/EC) against discrimination at work on grounds of religion or belief, disability, age or sexual orientation.

The paper is organized as follows. Because the diversity is a contested term and it is used in different ways by social scientists, we review the literature on socio-spatial diversity and the residential patterns of different social groups in city. On the basis of the literature review we propose our own understanding of diversity and divide it into four dimensions. In the third section we describe the census data in the UK and Poland used to characterize the diversity of communities in Leeds and Warsaw and outline the methods of clustering used. In the fourth section we report on the results of a multidimensional cluster analysis identifying the different diversity types of communities in the two cities. The paper concludes with a discussion of the main findings.

### **Diversity in cities: a review**

The analysis of the geography of social diversity in cities has a long pedigree. Archaeologists, social historians, and novelists have provided descriptions of urban social life across the ages, ranging from accounts of ancient Rome (McCullough, 1991), Tudor London (Sansom, 2003), Victorian Manchester (Engels, 1845) and the turn of 19<sup>th</sup>/20<sup>th</sup> Century working class Warsaw (Żarnowska, 1985). At the end of the 19<sup>th</sup> Century two important studies of poverty in Britain were conducted – one by the Rowntree family (Parekh et al., 2010) and the other by Charles Booth (Booth, 1889). Orford et al. (2002) and Buck et al. (2002) replicated Booth's analysis for London using census data. Similarly, there is a large literature on the changing spatial distributions of minority ethnic groups. The traditional model was formulated in an important series of studies of foreign-born, international immigrants and of native-born internal in-migrants in Chicago in the period 1910-1970 (Park et al., 1925; Wirth, 1938; Duncan and Duncan, 1957).

While studies that mapped diversity in the 20<sup>th</sup> Century highlighted social class differences or ethnic backgrounds of various social groups, other *social studies acknowledge the multidimensionality of social diversity and take into account multiple social group affiliations of people and their multiple social identities that produce differences in the residential patterns in the city*. In the exercise of mapping we have incorporated the broad understanding of diversity drawing on different quantitative and qualitative social studies to capture these various characteristics that compose social diversity.

We divide diversity into several dimensions that have different dynamics through people's life course careers and reflect people's affiliation to different types of social groups (i.e. people who interact with each other, recognise themselves as members of the same group and share similar identity) or social categories (i.e. people who do not interact with each other, but share the same characteristics). We discuss family/demographic, socio-economic, affinity and disability dimensions. For each dimension we review the literature on residential patterns.

### *The family/demographic status dimension*

Each individual is a part of a primary group, i.e. people with whom they have close, personal or kinship-based relationships. Our primary relationships depend on our age, sexual orientation and family type we are involved with. During the course of life we travel through a variety of stages in which we live with others for shorter or longer periods in families, in households or alone. Things happen to change your life course status whether you like it or not (you age, your spouse/partner dies) or as result of choice (you marry or not, you enter a partnership or not, you have children or not), but the choices change with age.

Many of the patterns of age and family segregation are comparatively recent phenomena in contemporary society and stem from economic and political changes, i.e. shifting away from home based system of production when people belonging to different generations shared the same household space and were working at home (Vanderbeck, 2007). Today, most families in the United Kingdom and in Poland live in two-generation households – parents and their offspring. But the number of one person households has increased because young people choose to live alone for longer before partnership or marriage and because there are older persons who have lost their spouse or partner through death (Dorling and Rees, 2003). Residential patterns influence opportunities to encounter people of different age groups. Some research show that spatial isolation of elderly is followed by their social isolation (Becker, 2003); others highlight the role of the neighbourhood as a socialisation spaces for older residents (Fadda et al., 2010; Scharf et al., 2003). Age segregation, lack of meaningful contact and understanding of people in different age groups may lead to ageism, i.e. prejudice based on age (Maxey, 2009).

Primary relationships depend on the sexuality too. Decades ago, Levine (1979) showed that major American cities contained ‘gay ghettos’ (called also ‘gay villages’ or ‘queer spaces’; Rushbrook, 2002) – neighbourhoods where lesbian, gay, bisexual and transgender people (LGBT) live and places they gather and spend spare time. Most urban space in Western societies is organised and appropriated by heterosexuals and does not reflect gay and lesbian lifestyles (Valentine, 1993). Thus, LGBT people’s residential patterns may be different from heterosexual people’s residential preferences. However, the ‘urban gay enclave’ concept can be criticized as it presents gay communities as uniform and omits differences among LGBT people in relation to their class, ethnicity or gender (Miller, 2009).

### *The socio-economic status dimension*

Individuals belong also to many secondary groups which are more formalised and institutionalised than primary groups, e.g. university, working place and some interest groups. The most important are reference secondary groups – people we compare with and refer to when we evaluate our achievements, aspirations and ambitions. Level of education or qualifications, occupation and income constitute basic characteristics that help people compare themselves with others. Socio-economic status is age dependent as well and changes through the life course. In the first years of our lives we are dependent on our parents who support us financially. Later, we mostly enter labour market and throughout our work career we change our occupation and our incomes rise or fall. Our socio-economic status is reflected in our consumption patterns, e.g. the housing we consume. Socio-economic status allows people to move into and out of different strata, i.e. be upwardly or downwardly mobile.

The studies carried out in the last century demonstrated that people belonging to different social classes lived in different areas in cities. Their decisions were shaped by housing policy and housing market developments which both influence the price of the land and housing, so the spatial patterns depend on household wealth and income (e.g. Burgess, 1925; Hoyt, 1939; Rees, 1970, 1979). The nature of today's society is more fragmented and fluid. Social class inequalities are based not only on differences in wealth and income, but also reflect access to other resources, such as cultural capital (Duncan, 2009). Other factors that shape people's residential preferences are their occupation (Fielding, 2004) or education (Freeman, 2009), because they determine people's incomes and life styles.

### *The ethnicity/affinity dimension*

Both primary and secondary groups are situated in affinity groups, that is, larger social groups that people feel attached to although they do not know each other in person, such as national, ethnic or religious groups. We can again broaden the life course into the ethnic life course. Ethnicity is generally rather a 'sticky' and unchangeable characteristic, i.e. people tend to stay in the same group for their whole life. However, there are some groups of people that are more prone to change their ethnic affiliation, e.g. international migrants or people with dual (or multi) ethnic background.

The diversity of migration histories and backgrounds means diversity in spatial outcomes (Peach, 2009). Studies on ethnic minorities in urban space very often include other variables which may account for their spatial location. Several researchers have examined whether the socio-economic profile of a minority ethnic group explains its degree of segregation from the indigenous community – it usually does not (Taueber and Taueber, 1964; Rees, 1979). Other authors studied

housing market forces in cities: the housing careers of minority ethnic groups (Housing Studies 2002), dwelling choices by price and type, control over institutional resources of local population and regulation over rent control (Urban Studies 1998). Cultural factors, such as cultural traits and affinity to country of origin, type of social networks, existence of mutual support and availability of national services (Peach 1996) play a major causal role in shaping residential patterns of minority ethnic communities too.

Religion is another aspect of the affinity dimension of diversity that can serve as a criterion for spatial differentiation. Many studies of religious segregation focus on Jewish groups (Valins, 2003) or on Muslim groups (Phillips, 2006; Varady 2008), or on both groups (Flint, 2010). Especially interesting are studies that identify the intersections of diversity dimensions, for example Muslim concentration and its relation to housing discrimination and socioeconomic status (Varady, 2008), class structure and religion background within one ethnic group, e.g. spatial distribution of three faith groups – Hindu, Sikh and Muslim – among Indian ethnic populations (Munoz, 2010), class, gender and age differences and Muslims' neighbourhood aspirations (Phillips, 2006).

### *The disability dimension*

Disability is a different dimension of diversity. It is a broad category, as it includes mental and physical disability. Some chronic or serious illnesses, like cancer or HIV/AIDS are sometimes included as disabilities. It is a relative characteristic: being disabled depends on society's definition of who is disabled. It is socially constructed, especially in the case of mental ill-health and also depends on people's perception of their limitations. We can combine this diversity dimension with the life course concept and consider the disability life course. Disability can be a constant characteristic or change over time. People are born with some disabilities (i.e. congenital disorders), but also there are types of disabilities that we acquire with age, e.g. vision, hearing or mobility impairments. Other types of disability are totally accidental, e.g. results of accidents, from which we may fully or partially recover.

One of the main topics in the literature on (dis)ability is exclusion of some people by environmental barriers in urban space (Butler and Bowly, 1997; Dear et al., 1997; Matthews and Vujakovic, 1995). Other studies examined influence of physical barriers on attitudes towards presence of disabled people in urban public spaces (Dear et al., 1997; Takahashi 1997). Disabled people are very often multiply disadvantaged. As Chouinard (1997) points out: "being out of place also finds expression in economic and cultural marginalization". Disabled people have more difficult access to everyday life space, but also they are excluded from education and labour markets, e.g. by lack of specific accommodation in the workplace (Wilton, 2004). Disability rates

are strongly linked with increasing age and they correlate with poverty, so it is possible to find spatial concentrations of the disabled in the residential space of Leeds or Warsaw.

### *Broader thinking about social diversity: multidimensional socio-spatial diversity*

The dimensions of diversity have two important traits that should be underlined. First, diversity dimensions are *interdependent*. Changes in one dimension impact other dimensions. For example, as you get older, you improve your education or change occupation. Similarly, the probability of disability is higher for older people or for people that are in a higher risk occupation, such as manual workers. The second trait of diversity dimensions is *complexity*. All specified diversity dimensions can be studied in a cross-sectional manner at the different spatial levels. We can consider how diverse families or households, small neighbourhoods, larger communities within cities are and how diverse the whole city population is; spatial units have different levels of diversity in the specified dimensions.

The aim of the paper is to map multidimensional diversity at the community level and investigate what are the patterns of diversity in Leeds and Warsaw. We argue that decisive role in diversity construction in urban space is played by interplay between the diversity dimensions. Because diversity is socially and spatially constructed people encounter different diversity patterns in communities. Consequently, we argue that changes in characteristics of the four dimensions of diversity are of prime importance for people's encounter of diversity.

It is worth noting that diversity is differently verbalised by scholars: some speak about different characteristics, some about different group affiliations while other emphasise different social identities. Because the rest of the paper is based on the analysis of the census data for residential communities, *we will use statistical categories to describe diversity*. However, we know that the data have limitations as do not fully reflect social reality which is much more complex. We employ cluster analysis to bring together the diversity dimensions and to create community types with different diversity profiles.

## **Data and methods**

### *The cities studied*

In this paper we study two European cities, Leeds and Warsaw, linked in the last decade by two way migration. Leeds is an example of cities in Western Europe, which are ethnically diverse. Warsaw is an example of the more ethnically homogenous cities of Central and Eastern Europe. Leeds is a city with a population of 715 thousand in the 2001 Census, estimated to have reached 760 thousand in the mid-year estimates for 2009. The main minority ethnic groups are of Asian

origin, Indian and Pakistani, followed by Other White and Black Caribbean ethnicities. Key indicators are age, occupation, ethnicity and disability for Leeds and the UK as a whole are set out in Table 1. These show that Leeds lies close to the national average in all dimensions.

[Table 1 about here]

By contrast, Warsaw, the national capital of Poland, has a higher proportion of non-manual workers than Leeds and a higher share than Poland as a whole. Warsaw is approximately twice the size of Leeds in population, but occupies about the same land area, meaning that population densities are more than double those in Leeds. Apartments constituted 88% of Warsaw's housing stock in 2002 whereas in Leeds flats comprised only 17 percent of the housing stock in 2001. In general Polish cities have larger proportions of flats and apartments than English cities.

In comparison to Leeds, Warsaw is a more ethnically homogenous city. However, when we compare Warsaw to other Polish cities, we find it to be the most ethnically heterogeneous Polish city. It is estimated that every fourth foreigner living in Poland resides in Warsaw. In 2004 foreigners constituted 1.3% of Warsaw population, but only 0.2% of total population in Poland (Office for Foreigners, 2004). The most numerous foreign immigrant groups living in Warsaw come from Asia, from Vietnam, but also from Armenia, Turkey and in recent years from China. Also important are citizens from the former Soviet Union countries, such as Ukraine, Russia and Belarus. There are also communities which originate in the European Union (France, Germany and Great Britain) and in the United States of America, engaged in Warsaw's international businesses or organizations.

### *Spatial communities studied*

Before we proceed to analyse diversity in both cities, we should define the term *spatial community*. Community is a form of social organisation based on commonality (Flint, 2009). By spatial community we mean a group of people living in the same area who share the common space and are linked to each other by relations outside of the immediate household. The sense of spatial community identity is promoted by use of a common name for an area, which may have deep historical origins. When we refer to a community in the rest of the paper, we mean, unless otherwise specified, spatial community.

How big is a spatial community within a city? They can range in size from people living in a few streets or blocks to quite large areas if population densities are low. In Leeds we chose to use *Community Areas* (CAs) employed by Unsworth and Stillwell (2004) to provide a common

statistical description of the city over the censuses of 1991 and 2001. These CAs were easily recognized by Leeds residents in a city council survey. Most have a community association that brings together its residents. Similar arguments led to the choice of *Urban Regions* (URs) in Warsaw. They were defined by Warsaw City Council in the 1967 and their names are more commonly used by residents than the names of much bigger districts. We could have chosen smaller areas (enumeration districts), but these were felt to be too small to cover the full range of social interactions; we could have chosen larger areas (e.g. electoral wards or districts), but these were felt not to describe the space of daily encounter which characterises the urban community.

The analysis of diversity was based on census data: from the 2001 census in the United Kingdom and from the 2002 census in Poland. We acquired data for Output Areas (OAs) in Leeds and Statistical Regions (SRs) in Warsaw which are the smallest zones for which the statistical data are available in both countries. Community Areas are groupings of OAs in Leeds, while Urban Regions are groupings of SRs in Warsaw. The number of study zones in the two cities is similar, 106 and 92. Both CAs and URs have similar area size, but URs are 2.5 times as dense, reflecting the dominance of apartment housing in Warsaw. Table 2 below reports on different levels of census geography with average size, population and number of households.

[Table 2 about here]

The two census datasets were compared variable by variable. We aimed to include variables representing each dimension of diversity and those that were similarly measured in both censuses to conduct unbiased analysis. There were some variables missing in both censuses that we would like to use, for example information on sexual orientation or income. Some variables were measured only in one census, like religion in the British census, while the citizenship and the language spoken at home in the Polish census only. Both variables would enrich the affinity dimension of diversity. Finally, we used here the ethnic group variable for Leeds and the nationality variable for Warsaw. There were two disability questions in the Polish census of 2002, but unfortunately the small area data were not available, so we could measure health diversity in the British city only.

After detailed comparisons the list of 28 variables was obtained which was further reduced by eliminating highly correlated variables<sup>3</sup>. For instance, the percentage of people aged 15-25 was highly correlated with the percentage of single people and with people with third level qualifications in Leeds and secondary education in Warsaw. People with the lowest levels of

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<sup>3</sup> Multi-collinearity effects in both datasets were measured. We calculated tolerance and variance inflation factors (VIFs) which assess the degree of multiple correlations between each independent variable and the rest of variables. Multicollinearity exists when Tolerance is below 0.1 and VIF is higher than 10.

qualifications/education were highly correlated with those with manual occupations, so we used one indicator – percentage of people with manual occupations – only. Finally, a set of 12 variables for Warsaw and a set of 14 variables for Leeds were used in the cluster analysis. The final list of variables is presented in Table 3.

[Table 3 about here]

Assuming we had measured the dimensions of diversity in residential communities properly, we combined the information from several dimensions to obtain profiles of community areas using a technique called *cluster analysis* (Everitt et al., 2001). Cluster analysis is employed in *geo-demographics* (Harris et al., 2005) to identify types of residential neighbourhood populations. We used geo-demographic techniques to identify clusters of Community Areas in Leeds and of Urban Regions in Warsaw that had similar diversity profiles. The cluster analysis enabled us to include many variables important from the perspective of opportunity to encounter multidimensional diversity at the community level. We wanted to maintain the interpretability of the cluster profiles and so decided not to use factor analysis, which makes interpretations more fuzzy.

We ran three cluster analyses: one for each city separately (with 14 variables for Leeds and 12 for Warsaw) and one combined analysis for the two cities (with three variables: v3, v8 and v12). Different clustering methods were tested prior to implementing the final clustering procedures. Because we aimed to produce a single tier classification, we adopted a non-hierarchical method, i.e. the k-means method (Beale et al., 2009). As the distance measure we used Manhattan distance which proved to be superior to Euclidean distance (Aggarwal et al., 2001; Dennett and Stilwell, 2009). To carry out the clustering we used the software package MATrix LABoratory Statistics Toolbox (MATLAB; Beale et al., 2009). In the cluster analysis we generated 200 replicates to obtain the optimum number of clusters and then used 1000 replicates of that number to discover the best solution. Finally, k-means clustering, using Manhattan distance, was run for 2-16 cluster solutions. The best cluster solution was sought by applying two types of diagnostics: average absolute intra-cluster distances and silhouette plots.

## **Multidimensional diversity: cluster analyses of Leeds and Warsaw**

### *Diversity in the four dimensions*

While comparing the two cities we have to bear in mind that both cities are in a different stage of the 'city life cycle' with Warsaw being in the suburbanisation and de-concentration phase (Śleszyński, 2004) and with Leeds being in the consolidation, renewal and infill phase (Rees et al., 2004). Consequently, the demographic, social and ethnic population groups are spatially distributed in different ways in both cities.

In the British city the older population lives in the suburban areas, but in the Polish city the 'oldest' residential communities are located in the city centre. Regarding the younger residents, the highest concentration of them can be found northwest of the Leeds's two centrally located universities (University of Leeds and Leeds Metropolitan University). The ring of suburbs in Leeds with older populations results from ageing of people who moved into these areas when younger. While in Warsaw, the URs with the youngest population are the newer housing estates in the south, north and north-west, though new families are also moving outside the city (Potrykowska and Śleszyński, 2001). The areas outside the city centre have not yet aged (compare maps 1 and 2 in the Figure 1).

The working class population (people with manual occupations) lives in the south and the centre in Leeds; a north-south division is visible in Leeds between people with more skilled occupations in north Leeds and people with more routine occupations in south Leeds (Stillwell and Shepherd, 2004). In Warsaw there are several post-industrial regions, where during the Socialism era some factories were 'planted' in order to reduce percentage of middle class people and increase the share of proletariat living in the city (Węclawowicz, 2005). Nowadays, the middle class population is in a majority in Warsaw (68% of residents have non-manual occupations), while in Leeds only 4 out of 10 communities have more residents with manual occupations than non-manual (maps 3 and 4 in the Figure 1).

[Figure 1 about here]

Regarding the ethnic composition of the two cities, Warsaw is a homogenous area, with a share of foreign residents lower than 1%, while in Leeds ethnic minorities comprise almost 11% of the population. However, in the Polish city there are some regions where populations with non-Polish origins are more numerous and their share reaches 3%, e.g. in the areas where highly skilled workers of international organisations live (south Warsaw), in the western city centre where the Vietnamese live for whom the propensity to spatially concentrate is more common than for

Ukrainians (Grzymała-Kazłowska and Piekut, 2007). On the other hand, in the British city there are some Community Areas in the northern inner city where the minority ethnic population non-White British is in the majority. Due to an increase of international students, CAs in the city centre are also more ethnically diverse in Leeds (Phillips et al., 2004), (maps 5 and 6 in Figure 1).

The population reporting disability in the census lives in central and southern Leeds (map 7 in the Figure 1). The disability variable is a function of age and socio-economic status. Disability and limiting long-term illness increases with age, but it is also associated with material deprivation (Brown and Rees, 2006; Rees et al., 2009).

*Results of the cluster analysis: different opportunities to encounter social diversity*

Cluster analyses were run for each city separately and classified the Community Areas in Leeds and the Urban Regions in Warsaw with similar characteristics into eight types of communities in each city, minimising intra-cluster variability. Results of the classification are presented in four dimensional graphs in Figures 2 and 3. Demographic diversity is represented by the percentage of people aged 65 and over on the Y axis; socio-economic diversity by percentage of population with manual occupations on the X axis; the bubble colours represent clusters; the bubble size represents the share of non White British population in Leeds and non Polish residents in Warsaw.

[Figure 2 about here]

[Figure 3 about here]

The diversity profiles of the two cities are very dissimilar. Warsaw Urban Regions have broader ranges of age and occupation variables than Community Areas in Leeds. However, the CAs in the British city are more evenly distributed across variables, while in case of Polish city the URs more often have values close to the mean of the variables. What this means is that some clusters in the Polish city are more similar to one another than are clusters in Leeds.

In both cities the population was unevenly distributed across clusters and the cluster sizes varied from 3% to 30% of resident population in Leeds or Warsaw. There are clusters with only a few CAs or URs and some that comprise of 15 zones or more. The average values for some selected statistics for each cluster are presented in Tables 4 and 5.

[Table 4 about here]

[Table 5 about here }

Cluster solutions are presented in maps with short descriptions in Figures 4 and 6 that are followed by more detailed accounts first for Leeds and then for Warsaw. The z-scores for the key variables for each cluster are presented in Figure 5 for Leeds and Figure 7 for Warsaw.

[Figure 4 about here]

Almost 30% of Leeds population lives in the Community Areas classified into cluster 1. The cluster is more often inhabited by families with children; middle aged people are overrepresented, while population aged 15-24 is underrepresented. The cluster covers a mix of people of different socio-economic backgrounds who live in good quality housing outside the city centre.

Meanwhile, there are different types of families living in clusters 2, 5 and 8 with lone parents being overrepresented. While in cluster 2 these are big minority ethnic households living in their own houses, in clusters 5 and 8 lone parents live in council flats with worse quality housing. All three clusters are inhabited by working class people, but only cluster 8 has a high share of disabled residents.

Community Areas classified into cluster 3 have similar demographic and ethnic profiles to those in cluster 1. However, these clusters, located mostly in northern Leeds, are inhabited by people with higher qualifications and more often with non-manual occupations than in cluster 1. The residential communities in cluster 6 share some characteristics with cluster 1 too, in terms of socio-economic, ethnic and disability profile, but the population is older, and people aged 15-44 are underrepresented.

The youngest population lives in neighbouring clusters in the central part of the city in clusters 4, 5 and 7. The residents are mostly single people with diverse ethnic backgrounds, living as couples or in non-family households in poor quality housing. The minority ethnic groups live also in clusters 5 and 7. In the former cluster they belong more often to the working class, while in the latter cluster they belong more to the middle class. This difference indicates a migration of minority ethnic people to northern Leeds which is made possible by the upward social mobility of the group members (Harland and Stillwell, 2007; Stillwell and Phillips, 2006).

[Figure 5 about here]

[Figure 6 about here]

The biggest proportion of Warsaw's population lives in cluster 2. All Urban Regions classified into this cluster are located in the central part of the city with the highest density of population and of flat housing. The central area is more often inhabited by older people, lone parents, small households and non-Polish residents than is the rest of the city. Populations with similar demographic and family profiles live in clusters 1 and 3 too. The former cluster is inhabited by Polish residents mostly, while people with higher education are overrepresented in cluster 1 and underrepresented in clusters 2 and 3.

Residents with non-Polish citizenship live also in cluster 4. Contrasting with the inhabitants of the three previous clusters (1, 2 and 3), the population of cluster 4 is more diversified in the demographic dimension and different age groups are evenly represented. What this means is that people of different backgrounds live in the same communities and these URs are the most diversified in the three diversity dimensions.

Cluster 5 covers mostly middle class people living in good quality housing. Regarding their demographic characteristics, these are middle aged people living as couples without children or being married. People with higher education and non-manual occupations more often live in cluster 6. However, the population here is younger than in cluster 5, with those aged 25-44 being overrepresented, and couples without children live there less often than in cluster 5.

Finally, residents who belong to the working class, who are mostly Polish citizens, live in clusters 7 and 8. While in cluster 7 these were more often lone parents and other people living in very poor standard council housing, inhabitants of cluster 8 are more often people in different family types living in their own flats or houses of better quality. The z-scores for the key variables for each cluster are presented in Figure 7.

[Figure 7 about here]

Each cluster in the two cities has different characteristics in the three or four dimensions of diversity, meaning that combinations of diversity were different, with different mixes of stages in the demographic or socio-economic cycle, different shares of ethnic minorities or health conditions of the resident population. In order to compare diversity patterns between the two cities we ran a combined cluster analysis, the results of which are presented in Figure 8.

[Figure 8 about here]

The combined cluster analysis produced a 9 cluster typology in which three clusters (4, 5, 6) were found only in Leeds and one cluster (9) was found only in Warsaw. Of the clusters shared between the cities, Warsaw dominated clusters 3 and 8, while Leeds dominated clusters 1 and 3. Only cluster 7 was truly shared between the two cities. Due to a much lower proportion of residents with non-indigenous ethnic background, the more ethnically diverse clusters are missing in Warsaw (clusters 1, 4, 5 and 6). Meanwhile clusters with higher share of people with non-manual occupations were more specific for the Polish city (clusters 1, 8 and 9) and there was only one middle class cluster in Leeds (cluster 4). Cluster 7, the only cluster that was evenly distributed among both cities, covers populations with typical, average age and socio-economic traits. So the opportunities to encounter diversity vary from community to community in the two cities, because of the way that they differ in the mix of different types of residents.

### **Discussion and conclusions**

The two cities have different social geographies resulting from dissimilar political histories, different roles played by the cities within their respective regions and countries, and their unique urban development. Consequently, there exist contrasting opportunities to have contacts with people who are different in terms of age and family status, socio-economic status, ethnicity and religion/belief and disability. We have demonstrated that the opportunities to encounter social diversity vary between Leeds and Warsaw, but also within each city, because the urban communities have different patterns of diversity.

We have analysed social diversity at the community level. However, we do not assume that people living in the communities are the same. People with different characteristics from the average profile of the cluster population may live there. For example, the socio-spatial structure of Warsaw is believed to have a 'mosaic' pattern (Węclawowicz, 2005). So within middle class regions there exist estates or streets with people belonging to the working class. Moreover, the analysis was based on 2001 and 2002 population censuses and we are aware that the cluster profiles could have changed since the censuses. The inter-community differences and changes in the characteristics of communities are the subject of a sample survey and in-depth interview undertaken in the "Living with Difference" project in Spring 2011.

The composition of diversity may affect attitudes towards 'other' people, prejudice and discriminatory behaviours. Age and economic status constitute two of the explanatory factors in shaping people's attitudes (see the 'in-group/out-group' concept of Tajfel, 1982). People in a different phase of a life course and those recruiting from different social classes have dissimilar needs and life styles that could be contradictory. While in Leeds the clusters with younger and both

middle and working class populations are the most ethnically diverse, in Warsaw minority ethnic groups more often share urban space with older people and residents with non-manual jobs. Another factor is the potential to encounter social diversity (Hewstone et al. 2001). The number of non-indigenous residents is considerably lower in Warsaw, so the contact with other ethnic groups is limited and less frequent than in Leeds. Still, even people who live in proximity can self-segregate within particular micro spaces (Valentine, 2008), so greater residential mixing does not necessarily lead to social integration (Phillips, 2006).

Diversity is very often equated with 'ethnic diversity'. However, it is worthwhile to think about diversity beyond the ethnicity dimension. The super-diversity concept recognises social diversity mostly among minority ethnic groups regarding their migration status, religious faith, age, gender or working status (Vertovec, 2007, 2010). The argument is that ethnic origins very often simplify and homogenise our research perspective on migrant communities. However, focusing on ethnic, religious or language minorities oversimplifies research perspective in another way. People with different ethnic backgrounds not only represent heterogeneous groups, but they also live among populations diverse in age, religious faith, (dis)ability conditions or employment characteristics. Thus, social processes, such as integration, are related to the composition of diversity at the local community level. While ethnic diversity is positive for cities bringing new cultural capital (Lee, 2010), the effects at the neighbourhood level may be different (Talen, 2009).

Moreover, shifting the discussion from the ethnicity oriented perspective to a wider discussion of social diversity allows us to eliminate minority ethnic stigmatisation by putting less emphasis on the cultural agenda of different ethnic groups and focusing on the shared characteristics and common interests of the whole society, e.g. stemming from being co-workers or living in the same neighbourhoods. The concept of multiculturalism has recently been disparaged by a number of politicians in Europe, so the discussions on diversity need to be reshaped. Thinking broadly about social and cultural diversity will help to 'de-racialise' the political debates in the UK, and help to start the political debate on diversity in Poland with a broader perspective.

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## References

- Aggarwal, C. C., Hinnenburg, A., Keim, D. A. (2001) On the surprising behaviour of distance metrics in high dimensional space, in: J. Van Den Bussche and V. Vianu (Ed.) International Conference on Database Theory 2001, Lecture Notes in Computer Science, vol. 1973, pp.420-434.
- Beale, M. H., Hagan, M. T., Howard, B. D. (2009) MATLAB Statistics Toolbox 7 User's Guide. The MathWorks Inc., Natick, MA. Accessed 10 January 2011, online at: [http://www.mathworks.com/help/pdf\\_doc/nnet/nnet.pdf](http://www.mathworks.com/help/pdf_doc/nnet/nnet.pdf).
- Becker, G. (2003) Meanings of place and displacement in three groups of older immigrants, *Journal of Aging Studies*, 17(2), pp. 129-149.
- Booth, C. (1889) *Life and Labour of the People*. First Series (i) East, Central and South London. London: Macmillan, republished 1969.
- Brown, D., Rees, P. (2006) Trends in local and small area mortality and morbidity in Yorkshire and the Humber: monitoring health inequalities, *Regional Studies*, 40, pp. 437-458.
- Buck, N., Gordon I., Hall P., Harloe M., Kleinman M. (2002) *Working Capital: Life and Labour in Contemporary London*. London: Routledge.
- Burgess, E.W. (1925) The growth of the city: an introduction to a research project, in: R.E. Park, E.W. Burgess, R.D McKenzie, *The City*, pp.47-62. Chicago: University of Chicago Press.
- Butler, R., Bowlby, S. (1997) Bodies and spaces: an exploration of disabled people's experiences of public space. *Environment and Planning D: Society and Space*, 15(4), pp. 411-433.
- Castles, S., Miller, M. J. (1998) *The Age of Migration: International Population Movements in the Modern World*. London: Macmillan.
- Chouinard, V. (1997) Making space for disabling differences: challenging ableist geographies, *Environment and Planning D: Society and Space*, 15(4), pp. 379-387.
- Dear, M., Gaber, S. L., Takahashi, L., Wilton, R. (1997) Seeing people differently: The socio-spatial construction of disability, *Environment and Planning D: Society and Space*, 15(4), pp. 455-480.
- Dennett, A., Stillwell, J. C. H. (2008) Internal migration in Great Britain – a district level analysis using 2001 Census data. Working Paper 08/01. School of Geography, University of Leeds. Accessed 28 December 2010, online at: <http://www.geog.leeds.ac.uk/fileadmin/downloads/school/research/wpapers/internal.pdf>.
- Dorling, D., Rees, P. (2003) A nation still dividing: the British census and social polarisation 1971-2001, *Environment and Planning A*, 35(7), pp.1287-1313.
- Duncan, N. (2009) Social Class, in: R. Kitchen, N. Thrift (Eds.) *The International Encyclopedia of Human Geography*, pp. 179-184. Oxford: Elsevier.
- Duncan, O. D., Duncan, B. (1957) *The Negro Population of Chicago: a Study in Residential Succession*. Chicago: University of Chicago Press.

- Engels, F. (1845) *Die Lage der Arbeitenden Klasse in England*. Translated by F.K. Wischnewetzky (1887) as *The Condition of the Working Class in England in 1844*. London: George Allen and Unwin. Accessed 28 December 2010, online at: <http://www.marxists.org/archive/marx/works/1845/conditionworkingclass/index.htm>.
- Everitt, B. S., Landau, S., Leese, M. (2001) *Cluster Analysis*. 4th Ed. London: Arnold.
- Fadda, G., Cortés, A., Olivi, A., Tovar, M. (2010) The perception of the values of urban space by senior citizens of Valparaiso, *Journal of Aging Studies*, 24(4), pp. 344-357.
- Fielding, A. J. (2004) Class and space: social segregation in Japanese cities, *Transactions of the Institute of British Geographers*, 29(1): pp. 64-84.
- Flint, J. (2009) Neighbourhood and Community, in: R. Kitchen, N. Thrift (Eds.) *The International Encyclopedia of Human Geography*, pp. 354-259. Oxford: Elsevier.
- Flint J. (2010). Faith and housing in England: promoting community cohesion or contributing to urban segregation?, *Journal of Ethnic and Migration Studies*, 36(2), pp. 257-274.
- Freeman, L. (2009) Neighbourhood diversity, metropolitan segregation and gentrification: what are the links to the US?, *Urban Studies*, 46(10), pp. 2079-2101.
- Grzymała-Kazłowska A., Piekut A. (2007) 'Mała Ukraina' czy Polskie *Viettown*? Społeczno-Przestrzenne Wzory Zamieszkiwania Imigrantów w Metropolii Warszawskiej ['Little Ukraine' or Polish *Viettown*? Social and Spatial Patterns of Immigrant Settlement in the Warsaw Agglomeration], *Studia Regionalne i Lokalne*, 4(30), pp. 77-99.
- Harland, K., Stillwell, J.C.H. (2007) Evidence of ethnic minority dispersal in Leeds, *The Yorkshire and Humber Regional Review*, 17(2), pp. 21-24.
- Harris, R., Sleight, P., Webber, R. (2005) *Geodemographics, GIS and Neighbourhood Targeting*. London: Wiley.
- Hewstone, M., Rubin, M., Willin, H. (2002) Intergroup bias, *Annual Review of Psychology*, 53, pp. 575-604.
- Housing Studies* (2002), 17(3).
- Hoyt, H. (1939) *The Structure and Growth of Residential Neighborhoods in American Cities*. Washington DC: Federal Housing Administration.
- Lee, N. (2010) Ethnic diversity and employment growth in English cities, *Urban Studies*, 48(2), pp. 407-425.
- Levine, M. P. (1979) Gay ghetto, *Journal of Homosexuality*, 4(4), pp. 363-377. Reprinted in expanded form as 'YMCA': The Social Organization of Gay Male Life, in: Levine M.P., *Gay Macho: The Life and Death of the Homosexual Clone*, pp. 30-54. New York: New York University Press.
- Matthews, M. H., Vujakovic, P. (1995) Private worlds and public places: mapping the environmental values of wheelchair users, *Environment and Planning A*, 27(7), pp. 1069-1083.

- Maxey, L. (2009) Ageism and Age, in: R. Kitchen, N. Thrift (Eds.) *The International Encyclopedia of Human Geography*, pp. 42-47. Oxford: Elsevier.
- McCullough, C. (1991) *The First Man in Rome*. London: Arrow Books.
- Miller, V. (2009) Gay geographies. in: R. Kitchen, N. Thrift (Eds.) *The International Encyclopedia of Human Geography*, pp. 302-308. Oxford: Elsevier.
- Munoz, S. A. (2010) Geographies of faith: the differing residential patterns of the Indian-Hindu, Indian-Sikh and Indian-Muslim populations of Dundee and Glasgow, *Population, Space and Place*, 16, pp. 269-285.
- Office for Foreigners, (2010) Dane liczbowe dotyczące postępowań prowadzonych wobec cudzoziemców za lata 2007-2009 [Quantitative data of procedures concerning foreigners in the years 2007-2009]. Accessed 28 December 2010, online at: [http://www.udsc.gov.pl/files/statystyki/biuletyn/biul\\_2007\\_2009\\_pol.xls](http://www.udsc.gov.pl/files/statystyki/biuletyn/biul_2007_2009_pol.xls).
- Orford, S., Dorling, D., Mitchell, R., Shaw, M., Davey-Smith, G. (2002) Life and death of the people of London: a historical GIS of Charles Booth's inquiry, *Health and Place*, 8(1), pp. 25-35.
- Parekh, A., MacInnes, T., Kenway, P. (2010) *Monitoring poverty and social exclusion 2010*. Accessed 3 January 2011, online at: <http://www.jrf.org.uk/sites/files/jrf/povertysocialexclusion2010full.pdf>.
- Park, R., Burgess, E. W., McKenzie, R. D. (1925) *The City*. Chicago: University of Chicago Press.
- Peach, C. (1996) Does Britain have ghettos?, *Transactions of the Institute of British Geographers, New Series*, 21(1), 216-235.
- Peach, C. (2009) Slippery Segregation: Discovering or Manufacturing Ghettos?, *Journal of Ethnic and Migration Studies*, 35(9), pp. 1381-1395.
- Phillips, D. (2006) Parallel lives? Challenging discourses of British Muslim self-segregation, *Environment and Planning D: Society and Space*, 24(1), pp. 25-40.
- Phillips, D., Stillwell, J. Burrage, A. (2004) Multicultural Leeds: geographies of ethnic minorities and religious groups, in: R. Unsworth, J. Stillwell (Ed.) *Twenty-First Century Leeds: Geographies of a Regional City*, pp.49-74. Leeds: Leeds University Press.
- Potrykowska, A., Śleszyński P. (2001). Mobilność przestrzenna ludności w aglomeracji warszawskiej (1990-98) [Spatial mobility of population in the Warsaw Agglomeration], in: I. Jażdżewska (Ed.). *Miasto postsocjalistyczne – organizacja przestrzeni miejskiej i jej przemiany (część II)* [Postsocialist city – urban space organization and its changes (part II)], pp. 63-76. XIV Konwersatorium Wiedzy o Mieście, Katedra Geografii Miast i Turyzmu UŁ, Komisja Geografii Osadnictwa i Ludności PTG, Łódź.
- Rees, P. (1970) The urban envelope: patterns and dynamics of population density, in: B. Berry, F. Horton (Eds.). *Geographic Perspectives on Urban Systems*, pp. 276-305. Prentice Hall, Englewood Cliffs, New Jersey.
- Rees, P. (1979) *Residential Patterns in American Chicago: 1960*. Chicago: The University of Chicago, Department of Geography, Research Paper No. 189.

- Rees, P., Stillwell, J.C.H., Tyler-Jones, A. (2004) The city is the people: demographic structure and dynamics, in: R. Unsworth, J. Stillwell (Eds.) *Twenty-First Century Leeds: Geographies of a Regional City*, pp.26-48. Leeds: Leeds University Press.
- Rees, P., Wohland, P., Norman, P. (2009) The estimation of mortality for ethnic groups at local scale within the United Kingdom, *Social Science and Medicine*, 69, pp.1592-1607.
- Rushbrook, D. (2002) Cities, queer space, and the cosmopolitan tourist, *GLQ: A Journal of Lesbian and Gay Studies*, 8(12), pp.183-206.
- Sansom, C.J. (2003) *Dark Fire*. London: Pan Books.
- Scharf, T., Phillipson, C., Smith, A. E. (2003) Older people's perceptions of the neighbourhood: evidence from socially deprived urban areas, *Sociological Research Online*, 8(4). Accessed 28 December 2010, online at: <http://www.socresonline.org.uk/8/4/scharf.html>.
- Śleszyński, P. (2004) Demograficzne przesłanki rozwoju rynku mieszkaniowego w aglomeracji warszawskiej [Demographic premises of housing market development in the Warsaw agglomeration], *Przegląd Geograficzny*, 76(4), pp.493-514.
- Stillwell, J., Phillips D. (2006) Diversity and change: understanding the ethnic geographies of Leeds, *Journal of Ethnic and Migration Studies*, 32(7), pp. 1131-1152.
- Stillwell, J.C.H., Shepherd, P. (2004) The 'haves' and 'have-nots': contrasting social geographies, in: R. Unsworth, J. Stillwell (Eds.) *Twenty-First Century Leeds: Geographies of a Regional City*, pp.127-146. Leeds: Leeds University Press.
- Taeuber, K.E., Taeuber, A.F. (1964) The negro as an immigrant group, *American Journal of Sociology*, 69(4), pp. 374-382.
- Tajfel, H. (1982) Social psychology of intergroup relations, *Annual Review of Psychology*, 33, pp. 1-39.
- Takahashi, L.M. (1997) Representation, attitudes, and behavior: analyzing the spatial dimensions of community response to mental disability, *Environment and Planning A*, 29(3), pp. 501-524.
- Talen, E. (2009) The context of diversity: a study of six Chicago neighbourhoods, *Urban Studies*, 47(3), pp. 486-513.
- Unsworth, R., Stillwell, J. (2004) *Twenty-First Century Leeds: Geographies of a Regional City*. Leeds: Leeds University Press.
- Urban Studies* (1998), 35(10).
- Valentine, G. (1993) (Hetero)sexing space: lesbian perceptions and experiences of everyday spaces, *Environment and Planning D: Society and Space*, 11(4), pp. 395-413.
- Valentine, G. (2008) Living with difference: reflections on geographies of encounter, *Progress in Human Geography*, 32, pp.321-335.

- Valins, O. (2003) Stubborn identities and the construction of socio-spatial boundaries: ultraorthodox Jews living in contemporary Britain, *Transactions of the Institute of British Geographers*, 28(2), pp. 158-175.
- Vanderbeck, R.M. (2007) Intergenerational geographies: age relations, segregation and reengagements, *Geography Compass*, 1(2), 200-221.
- Varady, D. (2008) Muslim residential clustering and political radicalism, *Housing Studies*, 23 (1), pp. 45-66.
- Vertovec, S. (2010) Towards post-multiculturalism? Changing communities, conditions and contexts of diversity, *International Social Science Journal*, 199, pp. 83-95.
- Vertovec, S. (2007) Super-diversity and its implications, *Ethnic and Racial Studies*, 29(6), pp.1024-54.
- Węclawowicz, G. (2005) The Warsaw Metropolitan Area on the eve of Poland's integration into the European Union, in: F. E. I. Hamilton, K. Dimitrovska Andrews, N. Pichler-Milanović (Eds.) *Transformation of Cities in Central and Eastern Europe – Towards Globalization*. United Nations University Press, Tokyo, New York, Paris.
- Wilton, R. D. (2004) From flexibility to accommodation? Disabled people and the reinvention of paid work, *Transactions of the Institute of British Geographers*, 29(4), pp. 420-432.
- Wirth, L. (1938). *Urbanism as a way of life: the city and contemporary civilization*, *American Journal of Sociology*, 44(1), pp. 1-24.
- Żarnowska, A. (1985) *Robotnicy Warszawy na przełomie XIX i XX wieku [Workers in Warsaw at the turn of the 19<sup>th</sup> and 20<sup>th</sup> centuries]*. Warsaw: PIW.

**Table 1.** The social characteristics of Leeds and Warsaw, the UK and Poland at the start of the 21<sup>st</sup> century

| <b>Variable</b>         | <b>Leeds 2001</b> | <b>UK 2001</b> | <b>Warsaw 2002</b> | <b>Poland 2002</b>                   |
|-------------------------|-------------------|----------------|--------------------|--------------------------------------|
| % Aged 65+              | 15.5              | 15.9           | 16.5               | 12.7                                 |
| % Manual occupations    | 47.5              | 47.1           | 32.0               | 52.5                                 |
| % Non-indigenous group  | 10.8              | 11.5           | 0.6                | 0.1                                  |
| % Disabled              | 18.0              | 18.5           | 8.0 <sup>4</sup>   | 11.6 <sup>4</sup> /14.3 <sup>5</sup> |
| Population              | 715,402           | 58,789,194     | 1,689,201          | 38,230,080                           |
| Area (km <sup>2</sup> ) | 551.7             | 244,820        | 516.9              | 322,575                              |
| Population Density      | 1296.7            | 240.1          | 3267.9             | 118.5                                |

Sources: 2001 Census of England & Wales, Scotland and Northern Ireland; 2002 Census of Poland.

Notes:

1. Non-indigenous group in the UK = not White British Ethnicity.
2. Non-indigenous group in Poland = not Polish citizens.
3. Disabled (Leeds only) = % reporting limiting long-term illness (LLTI), health problems and disability.
4. Legally disabled only.
5. Disabled legally and biologically.

**Table 2.** Key features of Census geography in Leeds (2001) and Warsaw (2002)

| <b>Level</b>              | <b>Number</b> | <b>Size (km<sup>2</sup>)<br/>(average)</b> | <b>Population<br/>(average)</b> | <b>Households<br/>(average)</b> |
|---------------------------|---------------|--|---------------------------------|---------------------------------|
| <i>Leeds</i>              |               |  |                                 |                                 |
| Output Areas (OAs)        | 2 439         | 0.22                                       | 293                             | 124                             |
| Community Areas (CAs)     | 106           | 5.2  | 6 749                           | 2 845                           |
| Wards                     | 33            | 16.7                                       | 21 679                          | 9 140                           |
| Leeds (district level)    | 1             | 551.7                                      | 715 402                         | 301 614                         |
| <i>Warsaw</i>             |               |  |                                 |                                 |
| Statistical Regions (SRs) | 1 442         | 0.36                                       | 1 171                           | 525                             |
| Urban Regions (URs)       | 92            | 5.6  | 18 361                          | 8 235                           |
| Districts                 | 18            | 28.7                                       | 93 845                          | 42 088                          |
| Warsaw (county level)     | 1             | 516.9                                      | 1 689 201                       | 757 578                         |

Source: The Office for National Statistics in the United Kingdom, Central Statistical Office in Poland.

Notes:

*Wards* – these are the electoral areas used in district elections in Leeds.

*Districts* – this is the term used in the UK to refer to the lowest level of administrative unit.

*Districts* – these are basic units that Warsaw is divided into. Districts have their own administrative bodies.

*County* – this is the term used in Poland to refer to the medium level of administrative unit.

**Table 3.** Variables used in the cluster analyses of Leeds and Warsaw

| <b>Diversity Dimension</b>  | <b>#</b> | <b>Indicator used</b>  |
|-----------------------------|----------|--|
| Demographic diversity       | v1       | Percentage of people aged 15-24  |
|                             | v2       | Percentage of people aged 25-44  |
|                             | v3       | Percentage of people aged 65 and more  |
|                             | v4       | Percentage of married people   |
|                             | v5       | Percentage of couples without children   |
|                             | v6       | Percentage of lone parents   |
|                             | v7       | Percentage of 4 and more persons households  |
| Socio-economic diversity    | v8       | Percentage of people with manual occupations   |
|                             | v9       | Percentage of people with higher education / level 4-5 qualifications                        |
|                             | v10      | Percentage of household rented from / owned by council                                       |
| Ethnic diversity            | v11      | Percentage of households of substandard quality / with standard rate -1                      |
|                             | v12      | Percentage of non White British / non Polish residents                                       |
| Disability (only for Leeds) | v13      | Percentage of population with limiting long-term illness (LLTI), health problems or disabled |
|                             | v14      | Percentage of people with good health  |

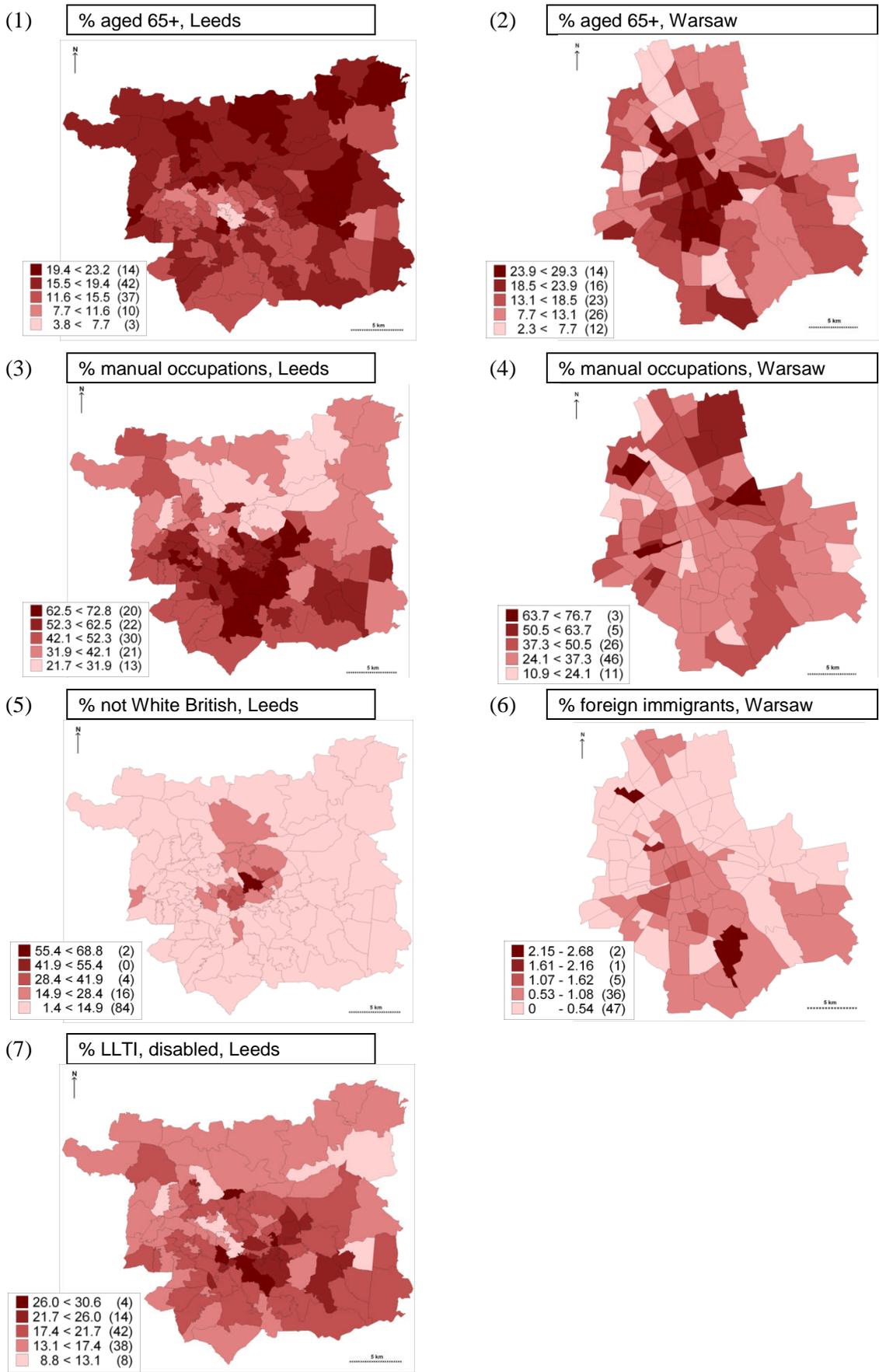
Note: Manual occupations were classified those in 5-9 groups of the Standard Occupational Classification.

**Table 4.** Selected statistics for eight clusters in Leeds

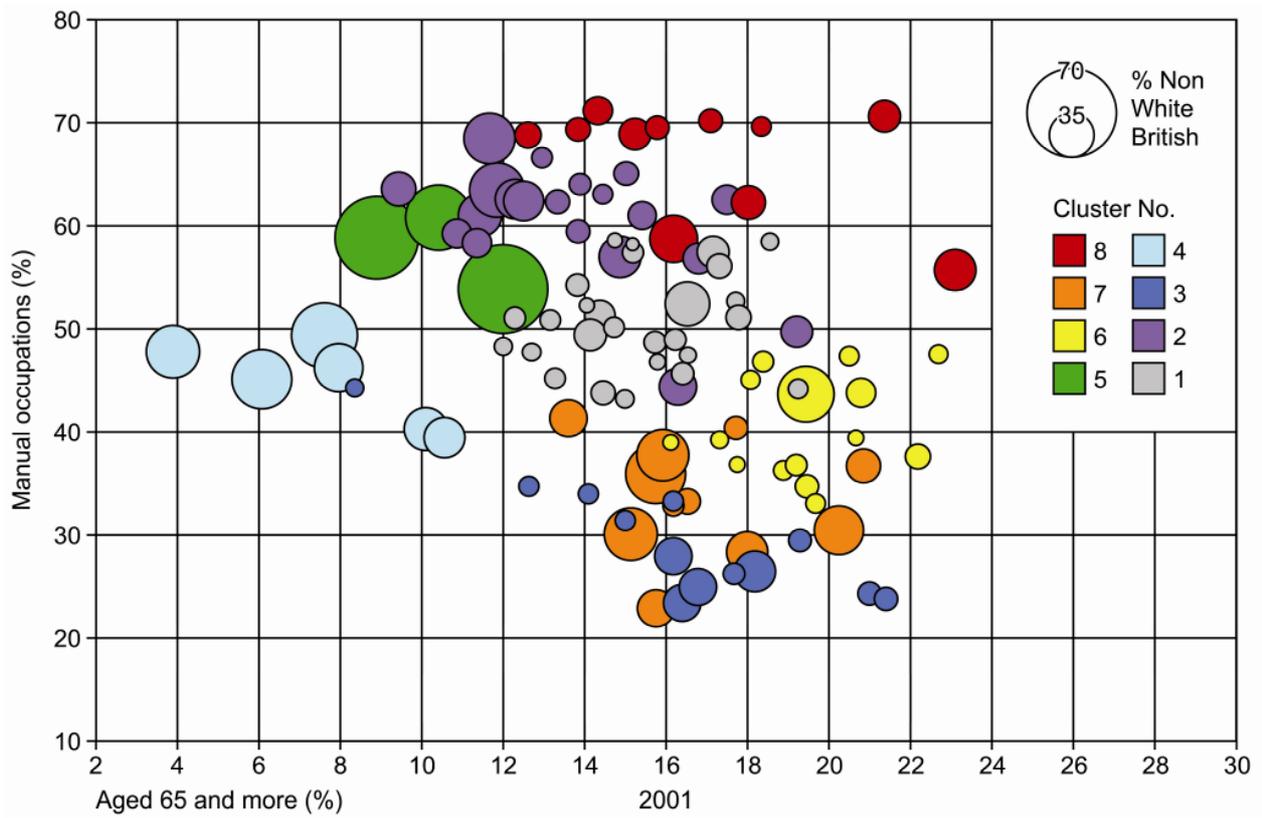
| Cluster solution | No of CAs | Population | Households | % of city population | % aged 65 and more | % manual occupation | % non White British | % with LLTI and Disabled |
|------------------|-----------|------------|------------|----------------------|--------------------|---------------------|---------------------|--------------------------|
| 1                | 27        | 208,622    | 87,586     | 29.2                 | 15.3               | 51.0                | 4.6                 | 17.8                     |
| 2                | 20        | 126,645    | 53,867     | 17.7                 | 13.5               | 62.3                | 10.7                | 20.3                     |
| 3                | 13        | 67,005     | 26,847     | 9.4                  | 16.2               | 29.7                | 8.4                 | 13.5                     |
| 4                | 6         | 49,373     | 20,015     | 6.9                  | 8.3                | 43.0                | 21.7                | 12.5                     |
| 5                | 3         | 23,825     | 10,147     | 3.3                  | 10.6               | 57.8                | 59.6                | 18.9                     |
| 6                | 15        | 98,272     | 40,901     | 13.7                 | 19.3               | 42.0                | 4.8                 | 17.6                     |
| 7                | 11        | 86,678     | 36,712     | 12.1                 | 17.1               | 33.3                | 16.7                | 16.9                     |
| 8                | 11        | 54,746     | 25,526     | 7.7                  | 17.2               | 67.3                | 8.7                 | 25.5                     |
| All clusters     | 106       | 715,402    | 301,601    | 100.0                | 15.5               | 47.5                | 10.8                | 18.0                     |

**Table 5.** Selected statistics for eight clusters in Warsaw

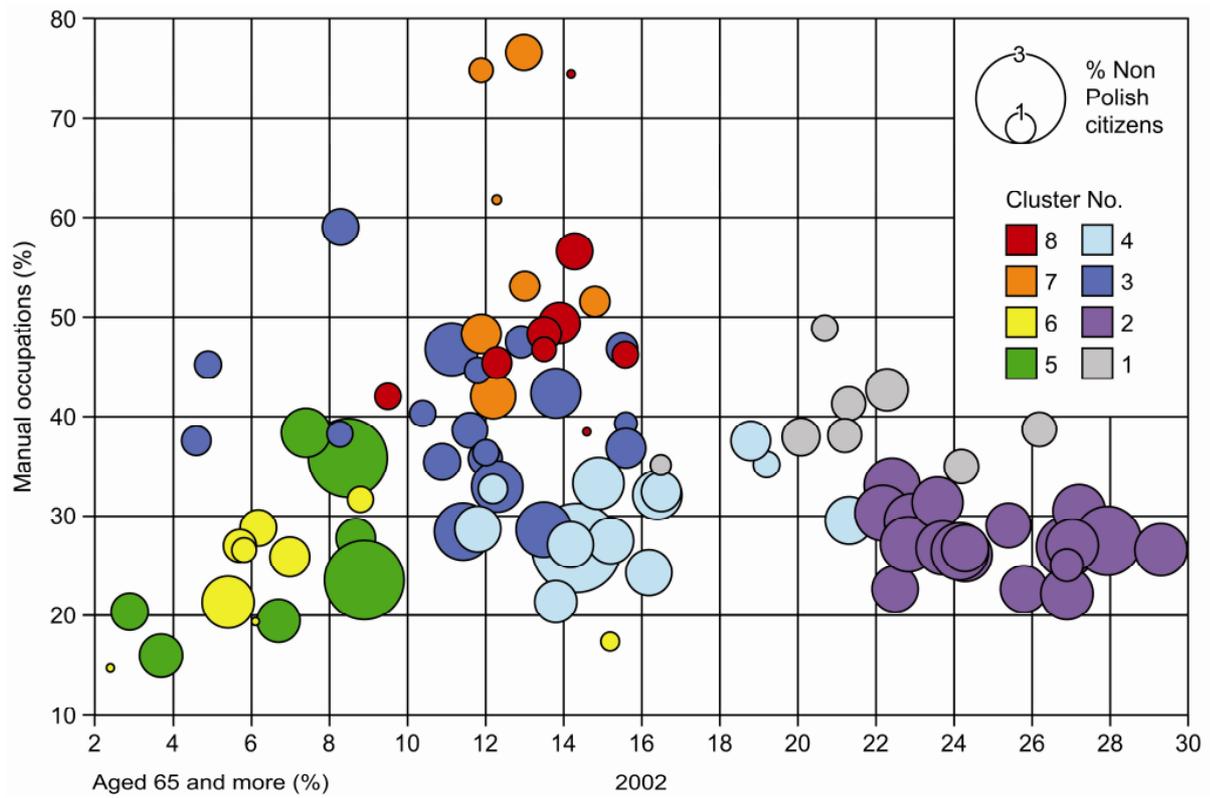
| Cluster solution | No of URs | Population | Households | % of city population | % aged 65 and more | % manual occupation | % foreign immigrants |
|------------------|-----------|------------|------------|----------------------|--------------------|---------------------|----------------------|
| 1                | 8         | 202,620    | 96,056     | 12.0                 | 22.0               | 40.2                | 0.4                  |
| 2                | 19        | 503,204    | 254,561    | 29.8                 | 24.5               | 27.8                | 0.9                  |
| 3                | 19        | 150,756    | 54,303     | 8.9                  | 10.7               | 38.6                | 0.4                  |
| 4                | 13        | 321,769    | 143,578    | 19.1                 | 15.9               | 29.9                | 0.7                  |
| 5                | 7         | 77,979     | 30,600     | 4.6                  | 4.2                | 18.5                | 0.7                  |
| 6                | 9         | 239,759    | 93,296     | 14.2                 | 6.9                | 27.5                | 0.4                  |
| 7                | 7         | 47,928     | 20,854     | 2.8                  | 12.5               | 50.5                | 0.4                  |
| 8                | 9         | 144,287    | 61,802     | 8.5                  | 12.5               | 45.8                | 0.2                  |
| All clusters     | 91        | 1,688,302  | 755,050    | 100.0                | 16.5               | 32.0                | 0.6                  |



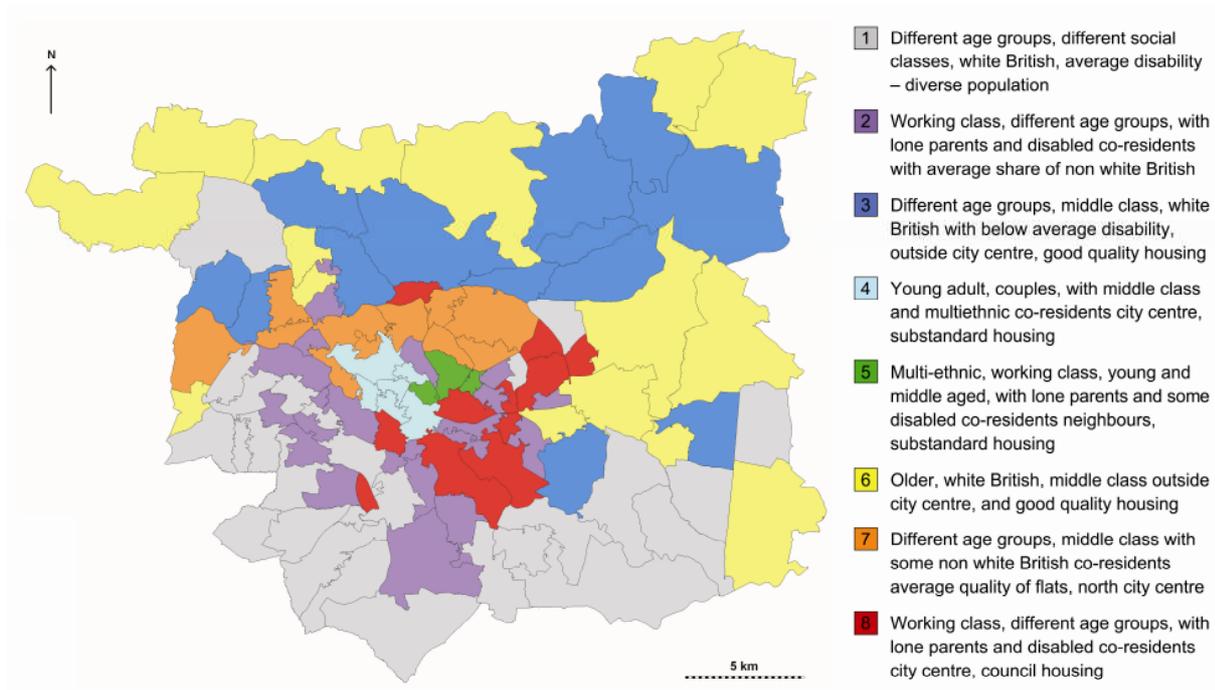
**Fig. 1.** The spatial pattern of matching key variables in Leeds and Warsaw  
 Sources: 2001 Census, Community Areas, Leeds; 2002 Census, Urban Regions, Warsaw



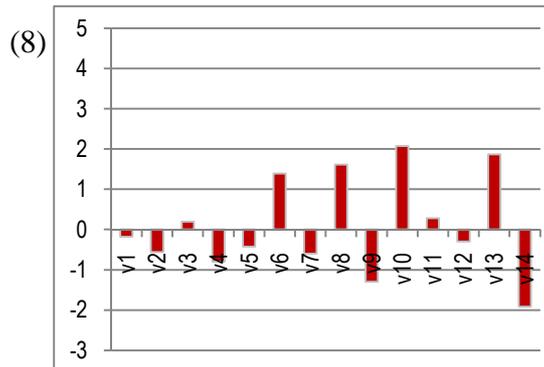
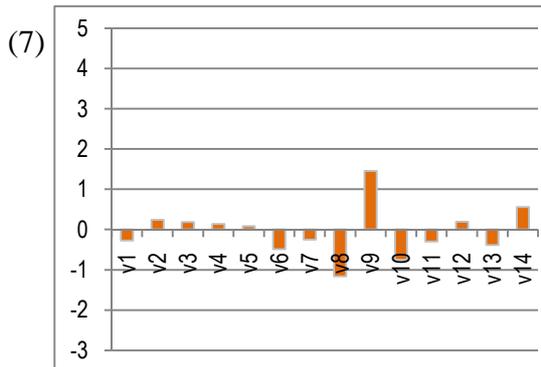
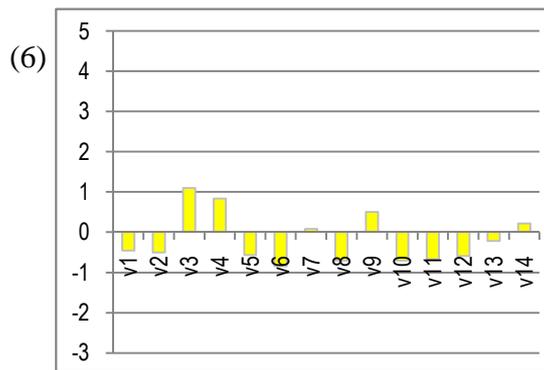
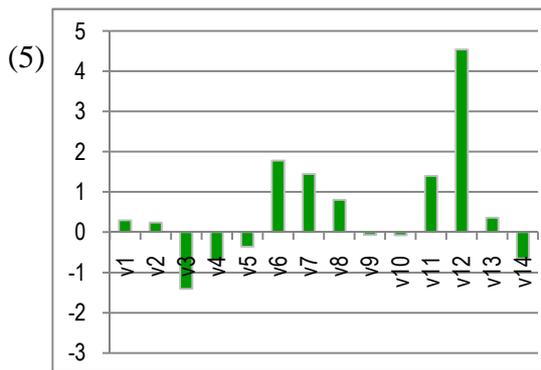
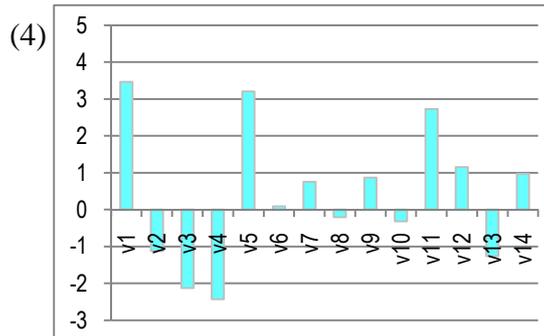
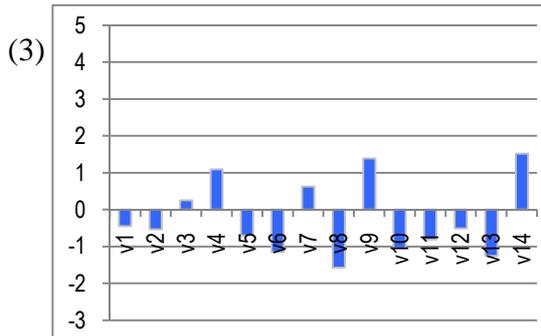
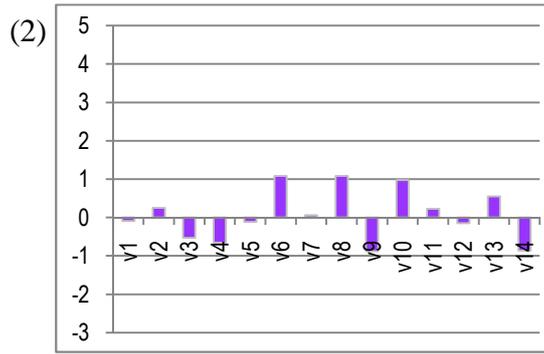
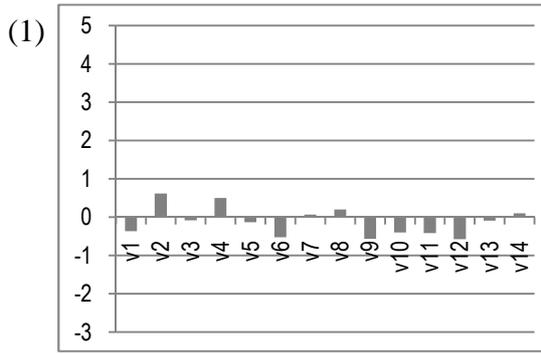
**Fig. 2.** Community Areas in Leeds plotted on a graph showing the three social dimensions



**Fig. 3.** Urban Regions in Warsaw plotted on a graph showing the three social dimensions



**Fig. 4.** Cluster classification of Community Areas in Leeds

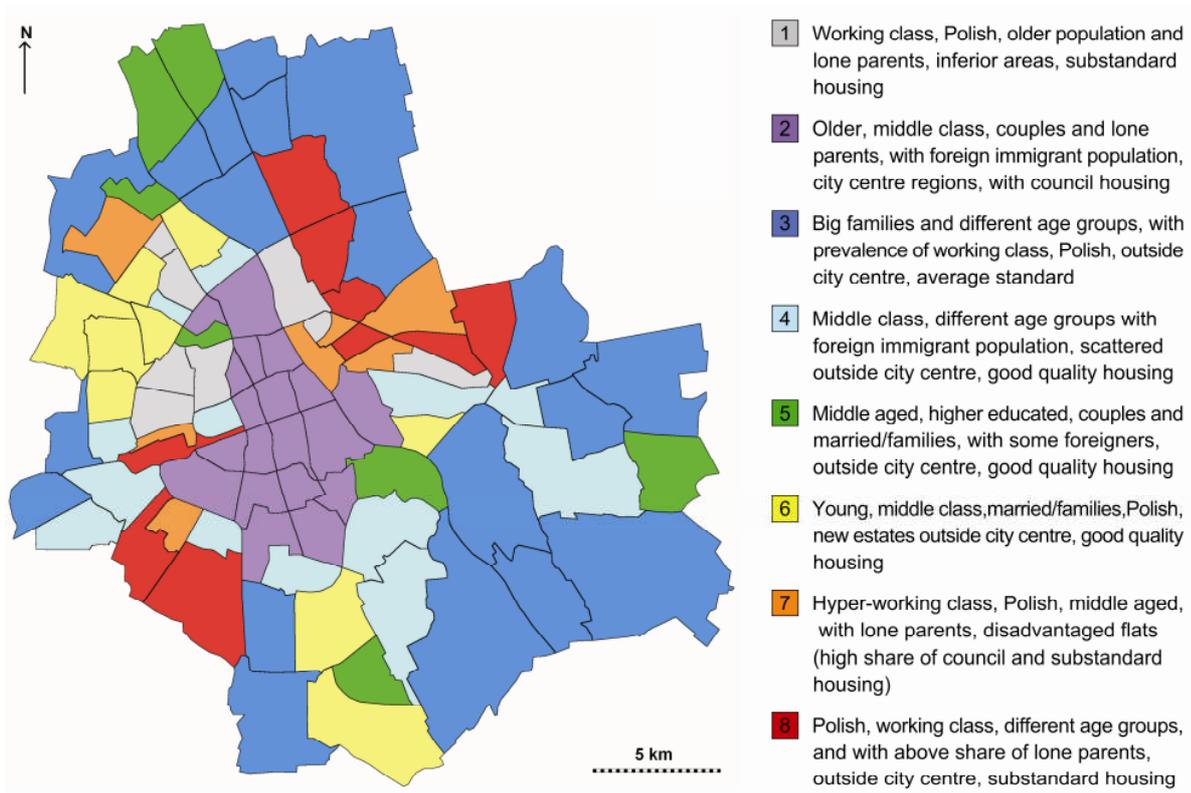


**Legend:**

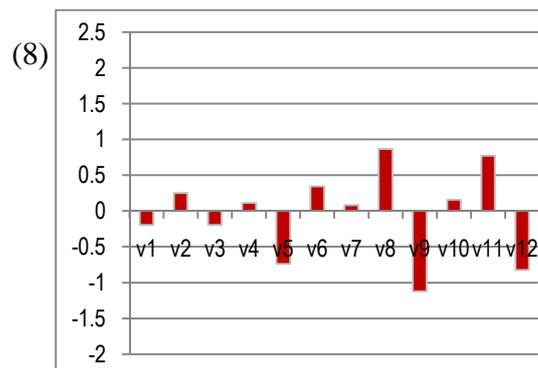
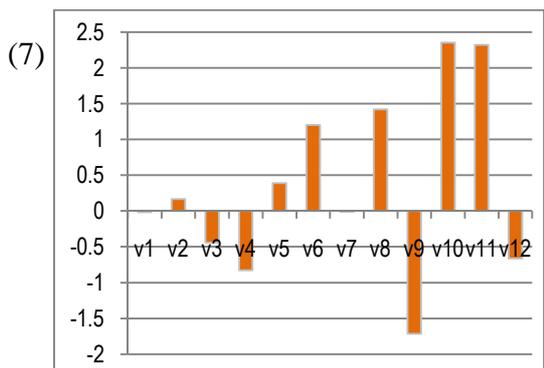
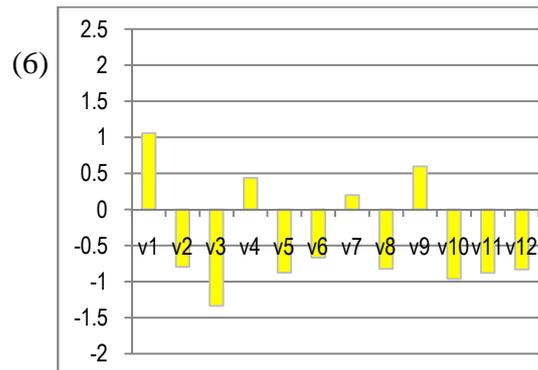
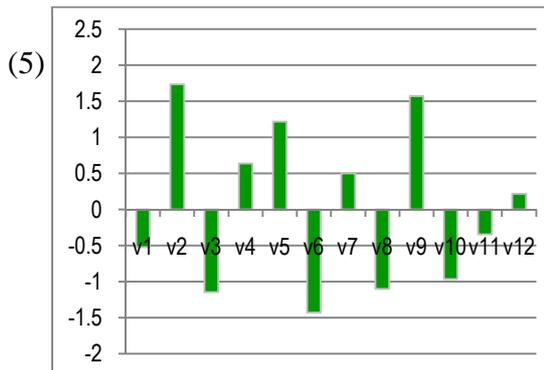
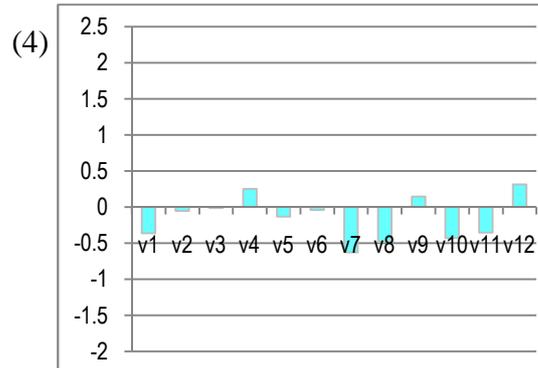
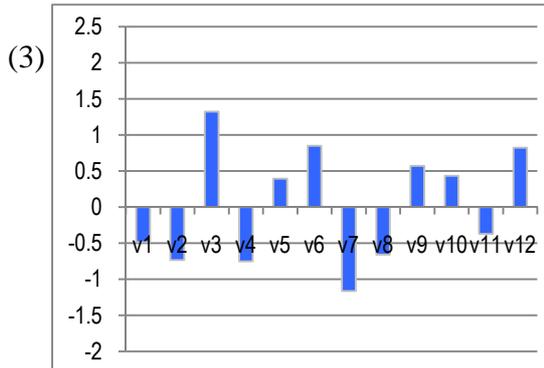
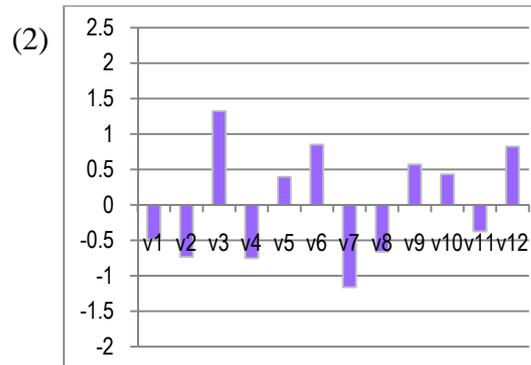
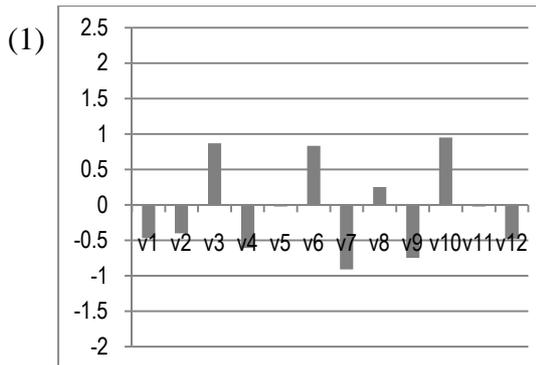
- v1 - Percentage of people aged 15-24
- v2 - Percentage of people aged 25-44
- v3 - Percentage of people aged 65 and more
- v4 - Percentage of married people
- v5 - Percentage of couples without children
- v6 - Percentage of lone parents
- v7 - Percentage of 4 and more persons households

- v8 - Percentage of people with manual occupations
- v9 - Percentage of people with 4-5 level of qualifications
- v10 - Percentage of household rented from council
- v11 - Percentage of households with standard rate -1
- v12 - Percentage of non White British
- v13 - Percentage of population with limiting long-term illness (LLTI), health problems or disabled
- v14 - Percentage of people with good health

**Fig. 5. Profiles of clusters in Leeds**



**Fig. 6.** Cluster classification of Urban Regions in Warsaw

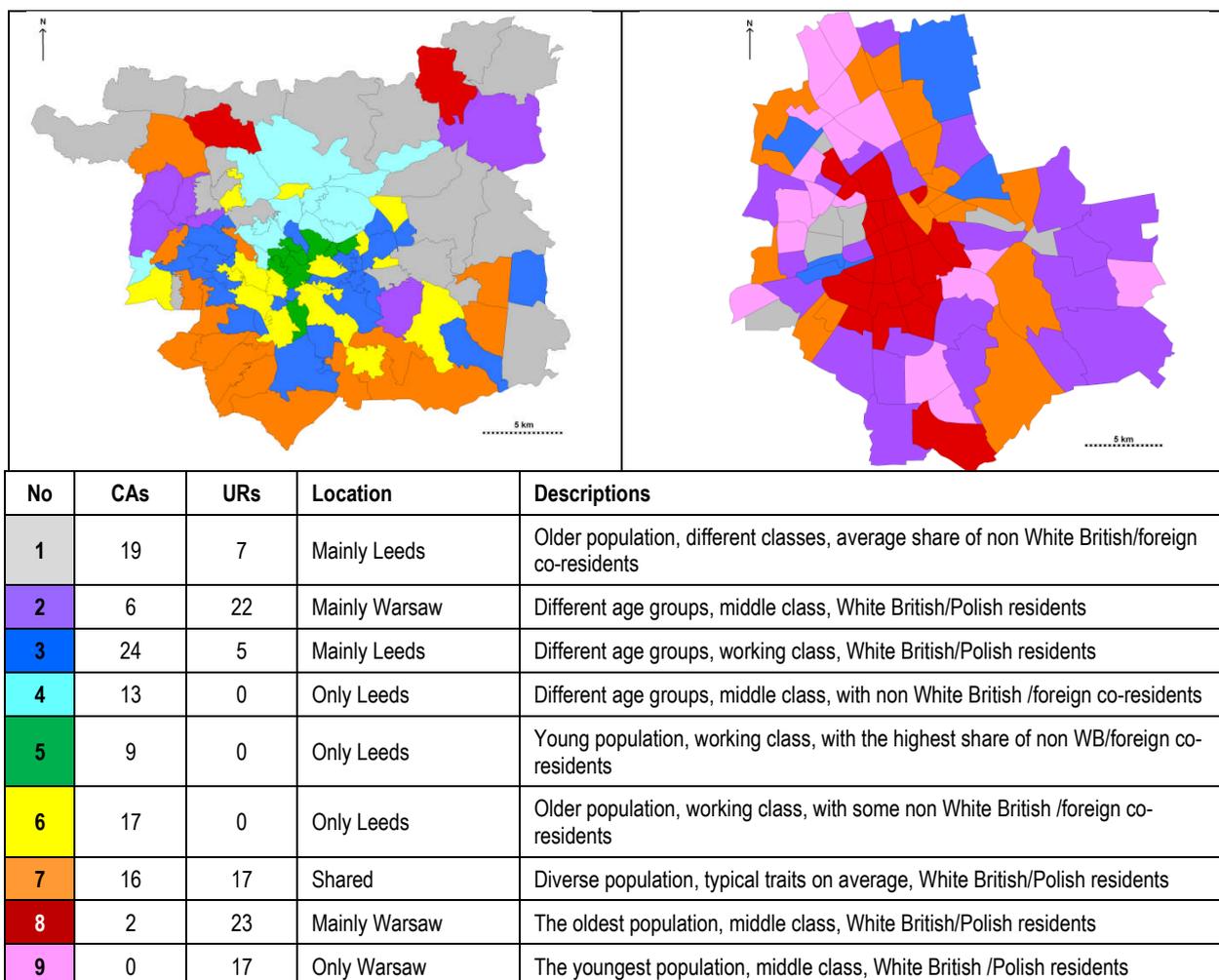


**Legend:**

- v1 - Percentage of people aged 15-24
- v2 - Percentage of people aged 25-44
- v3 - Percentage of people aged 65 and more
- v4 - Percentage of married people
- v5 - Percentage of couples without children
- v6 - Percentage of lone parents

- v7 - Percentage of 4 and more persons households
- v8 - Percentage of people with manual occupations
- v9 - Percentage of people with higher education
- v10 - Percentage of household rented/owned by council
- v11 - Percentage of substandard housing
- v12 - Percentage of foreign immigrants

**Fig. 7.** Profiles of clusters in Warsaw



**Fig. 8.** A combined classification of residential areas in Leeds and in Warsaw