DISTRIBUTIVE ENVIRONMENTAL JUSTICE IN THE CITY: DIFFERENTIAL ACCESS IN TWO MIXED ISRAELI CITIES

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ABSTRACT

The socio-economic inferiority of the Arab minority compared to the Jewish majority and the unequal distribution of resources between Jewish and Arab towns in Israel are well known facts. However, so far there has been no evidence establishing whether unequal resource allocation also occurs within mixed Jewish-Arab cities. Based on high-resolution sociodemographic and infrastructure data, this paper examines the access that populations of differing socio-economic levels and ethnic identity have to green spaces in the mixed Jewish-Arab cities of Ramla and Lod. Results show that the Arab minority in these cities has much less access to green spaces than the Jewish majority. The findings produced in this study can serve as a basis for public debates concerning injustice in the distribution of urban services and help urban planners achieve a more balanced and fair allocation. It can also serve as a powerful tool for empowering minorities, social organisations and NGOs and motivating them to act against spatial inequality and social discrimination.

Key words: Distributive justice, environmental justice, accessibility, high-resolution data, Arab-Jewish relations, mixed Israeli cities

INTRODUCTION

In Israel, as in other countries, the common notion is that spatial allocation of public goods reflects the social structure and power relations in society; i.e. strong populations, which in most cases are also of higher socio-economic status, choose to live in areas where the quality of living is high, and weaker populations have no choice but to reside in areas where the standard of living is low.

Attempts to deal with this issue have given rise to the concepts of *environmental justice* and *spatial equity*, which often reflect a normative judgment that is commonly used as a benchmark in public discourse: the spatial distribution of urban services with positive externalities and that of services with negative externalities should be balanced. As a way to check whether environmental justice has been violated, many studies considered the fairness of spatial allocation of wanted facilities, such as public urban services (Alterman & Amir 1983; Lantos *et al.* 1997; Werna 1998; Gandy 2002) and unwanted facilities (Capek 1992; Greenberg 2000; Jerrett *et al.* 2001; Lejano & Iseki 2001; Baden & Coursey 2002; Schweitzer & Valenzuela 2004) among minority and low-income populations. The inequality discourse also addresses *distributive justice*, but this discourse is in most cases limited to the evaluation of the unequal allocation of public resources such as education, welfare, housing and urban services. These concepts are used in many different disciplines and have received numerous interpretations and definitions. In this paper, the term *distributive environmental*

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justice refers to the spatial allocation of public urban services in relation to the distribution of social groups in the city.

This paper focuses on the unequal access that different socio-economic and ethnic groups have to green spaces in the city. Our case study consists of the cities of Ramla and Lod, in which both socio-economic and ethnic polarisation exist.[1] The purpose of this paper is to establish whether and to what extent the Jewish majority has greater access to green spaces, and to check whether this differential access, if confirmed, is related in any way to income levels. Though the advantage of access to green space has been questioned in the planning discourse in some countries (see, for example, Jacobs (1961) with respect to US cities), there is no doubt as to the positive externality of this amenity in the Israeli context, and especially in medium-size cities such as Ramla and Lod. An examination of the accessibility to green spaces in these cities as relating to both ethnic identity and socio-economic status would therefore enable a deeper understanding of the relationship between these two key factors in the stratification of Israeli society.

The socio-economic inferiority of the Arab minority compared to the Jewish majority in Israel is a well known fact. For example, in 1995 the average income of an Arab household was 60 per cent of that of an average Jewish household and per capita income in the Arab sector was 43 per cent of that in the Jewish sector. In the Arab sector, the population density was almost double that of the Jewish sector and the average years of schooling were around two thirds, as was the ratio of car owners (Mautner 2000). This gap between Jews and Arabs, explained in part by an institutional discrimination against the latter, is also evident in a non-egalitarian distribution of resources between Jewish and Arab towns. For example, in Arab towns 35–80 per cent less land is allocated for public use than the minimum recommended by the Ministry of Interior (Yiftachel 2000), and sewerage maintenance is far inferior to that in Jewish towns (Tal 2002). The socio-economic gap between Arabs and Jews in mixed cities is consistent with these figures (Roman & Weingrod 1991; Yiftachel & Yacobi 2003) and is also attributed in part to institutional discrimination in various fields (Smooha 1990, 2002; Portugali 1991; Yiftachel 1997). However, so far the analysis of inequality in resource allocation has only considered the differences between Jewish and Arab towns. The examination of the accessibility of green spaces in the cities of Ramla and Lod in relation to ethnic identity, provided in this study, will answer the question as to whether unequal resource allocation occurs within mixed cities as well.

The paper comprises four parts: The first presents the problems of evaluating environmental injustice in general and distributive environmental injustice in particular, with a focus on unequal access that social groups have to urban services in the city. The second part of the paper introduces the methodology devised for examining the accessibility of green spaces to social groups in the cities of Ramla and Lod. The third part provides findings and the fourth offers conclusions and a discussion.

THE METHODOLOGICAL PROBLEMS IN ASSESSING ENVIRONMENTAL JUSTICE

Environmental justice has recently gained recognition in the environmental and social discourse of distributive justice. It plays a key role in international conventions such as the Rio Declaration (Agenda 21)[2] and Aarhus Convention,[3] which underscore the duty of the authorities to enable individuals to properly understand the scientific and technological aspects of environmental matters. To accomplish this, authorities are to generate information and through laws and regulations, guarantee the accessibility of such information. Israel is no exception, and several studies have already been conducted regarding environmental hazards and the location of unwanted facilities (Tal 2002). The access that social groups have to housing (Kallus & Law-Yone 2000) and land resources (Yiftachel & Kedar 2000) was also examined as part of more general studies.

However, methodological problems make it difficult to assess distributive environmental justice. These problems stem from the absence of necessary criteria and data. In order to establish the adequacy of any assessment of distributive environmental justice in urban services such as public libraries, health services and green spaces, suitable criteria are required. Such criteria must be tailored specifically to the composition of and norms followed by the local population.

However, criteria of this kind are not always available. For example, uncertainty regarding the criteria for assessing the cleanliness and availability of green spaces in Arab and Jewish neighbourhoods in mixed cities makes it impossible to establish whether there is any distributive injustice that emanates from ethnic identity (Tal 2000).

However, even with suitable criteria with which to determine whether the standard of services in a given area is sufficient and balanced, there may still be a shortage of appropriate data about the population breakdown and the needs of the population in the studied area. Churchman & Sadan (2003) adequately expressed this data problem when they described the first meeting of the Israeli subcommittee on environmental justice that dealt with the question whether environmental injustice exists and how it is reflected: 'It was found that the committee did not have data pertaining to various subjects that would enable these questions to be answered. Granted, in some cases the facts speak and smell for themselves, as in the case of sewage flowing in the streets of Arab villages; but this is not enough' (Churchman & Sadan 2003, p. 14).

In many cases the shortage of appropriate data means that the data available is not sufficiently detailed and is only available at a scale of large aggregative administrative areas. With data of this kind alone, it is hard and even impossible to evaluate distributive environmental justice. Studies addressing the methodological problem of geographic scale in the context of environmental justice indicate that drawing conclusions as to the differential spatial distribution of public services or environmental hazards is sensitive to the scale at which the environmental phenomenon is measured. This problem, commonly referred to as the 'Modifiable Areal Unit Problem' (MAUP), stems from the use of aggregate datasets at different scales or of different spatial division (Openshaw 1984; Nakaya 2000; Hewko *et al.* 2002; Wong 2003), which leads to different and even conflicting conclusions (Greenberg & Cidon 1997; Talen & Anselin 1998). The MAUP is even more acute in the case of environmental phenomena that require detailed data, as in the case of environmental hazards whose influence is local, or in the case of access to local urban services with a relatively short service range.

The accessibility of green spaces, which is the subject of this paper, is also a subject that cannot be accurately assessed without sufficiently detailed data. This requirement is even compounded when the distributive environmental injustice addressed pertains to the difference between social groups or to discrimination against a certain group based on the spatial distribution of local urban services across the places in which these groups reside. A high level of detail is imperative in this case because in most cases the administrative municipal division into regions does not correlate with the spatial distribution of social groups (Benenson & Omer 2003). As argued by Williams (1999), without homogeneity it would be difficult to reach conclusions concerning environmental injustice and social discrimination in the context of spatial distribution of public resources. Thus, the unavailability of appropriate data seriously impacts the study and evaluation of the access that social groups in the city have to various resources.

However, recent developments in GIS technology and in the construction of urban databases have greatly improved the situation. The availability of geo-referenced infrastructure data that includes houses, roadways and the distribution of the examined urban services, makes it possible to measure distances from the buildings to the various services. Nevertheless, this improvement does not solve the problem of evaluating the differential access that social groups have to urban services, since the sociodemographic data is still not mapped by building but only by administrative areas (Talen 2003). Under these circumstances, a gap exists between the high level of detail of the urban services on the one hand and the low level of detail of the social attributes of the population on the other. The default option can be discarded if, like the data about infrastructure, data concerning social parameters is available down to the level of buildings. A detailed picture of this kind would enable an accurate assessment of the differential access that social groups have to urban services even if the residential patterns of these groups and the City's administrative zones do not fully overlap.

Israel is one of the only countries where scholars can obtain sociodemographic data per building (Benenson & Omer 2002). Since the 1995 census, Israel's Central Bureau of Statistics

started classifying data down to the level of the individual. The demographic and social data compiled in this census goes down to the level of households and buildings, in GIS layers. The following section describes the methodology employed in this study to evaluate the access that different social groups have to green spaces in the cities of Ramla and Lod. The data on which this methodology is based consists of sociodemographic attributes of the population and of the physical infrastructure, both at a building-level scale.

ASSESSING THE ACCESSIBILITY OF GREEN SPACES: DATA, CRITERIA AND MEASUREMENT

The methodology proposed for evaluating the access that social groups have to green spaces is based on the understanding that a valid evaluation of this kind can only be accomplished if building-level data is used. This premise dictated the choice of criteria, data and measurements for assessing accessibility.

Criteria – Usage patterns of public urban parks in Israel were examined by considering the type of the park, the type and time of usage, the population composition (children, elderly, etc.) and the distance of this population from the park (Chorem 1998). However, the criteria by which public urban park space is allocated, refers only to the size and service range of the park and to the size of the population that it serves. Accordingly, in the current study we concentrate on the allocation criteria and applied those proposed by the Israel Union for Environmental Defense (an environmental NGO called in Hebrew 'Adam Teva v'din') (Adam Teva v'Din 2000), which as a whole dovetails with the Ministry of Interior's guidelines for allocation of green spaces (Ministry of Interior 2002).[4] Under these criteria, residents are entitled to a green space of 4–5 sq. m per capita within 250 metres from their home, a green space of 7 sq. m within 400 metres of their home, and so on up to the city level, at which each resident is entitled to 20 sq. m of park space. For the sake of simplicity, we focus on an assessment of the access to green spaces within the immediate area only: a distance of 250 metres to a public park and a minimum quota of 4 sq. m of green space per person.

Data – The sociodemographic data retrieved from the 1995 census of the Central Bureau of Statistics. This census attributed data to specific households and residential buildings through GIS layers.[5] In the current study we account for only one demographic characteristic: the number of residents in each building, and to two social variables: income level, which represents socio-economic status, and religious affiliation, which indicates national-ethnic identity (Jewish or Arab) of the household. The income variable is based on the income earned as a self-employed person or salaried employee, as provided by the National Insurance Institute.[6] In order to obtain a normal distribution of income, the values of the average household income were converted into logarithms (Log_2). The variable of ethnic identity differentiates between the Jewish and non-Jewish population. Each of the two cities was divided into two ethnic groups, according to the religious affiliation of its population.[7] Apartment buildings in each city were classified as 'Jewish' or 'Arab' as follows: a building with a Jewish population of 80 per cent or more is defined 'Jewish' and one with an Arab population of 80 per cent or more is defined 'Arab'. Buildings with a different ethnic breakdown are considered 'mixed'. Buildings of this category were ignored because they are usually in the process of a change in their ethnic mix (Omer & Benenson 2002), and because in both cities they account for only a small proportion of all buildings (around 5% in Lod and 7% in Ramla).

In addition, the urban infrastructure data required for a building-level assessment of access to green spaces was retrieved from GIS layers of buildings (polygons of building) and green spaces (polygons of park boundaries) in Ramla and Lod. Consequently, the access of each apartment building to green space was defined using several GIS layers: a layer of green spaces and a layer of buildings, which includes information about the number of residents in each building, their average income and ethnic identity.

Measurement – The assessment of accessibility according to the criteria chosen for this study, using the method known as the 'coverage' approach. Traditionally, the coverage approach refers to the cumulative opportunities at a given location, by considering both the quality of the

service and the distance between the resident and the location of the service. That is, the number of facilities offering a given urban service is counted for each spatial aerial unit or range (Talen 2003, p. 183). However, to evaluate accessibility at the building level, the coverage measure must refer to the size of park area available to each building. For this purpose, the local version of the coverage measure can be formulated as follows:

$$A_i = \sum_{j=1}^{n} \frac{S_{p_j}}{Q_{P_j}} \qquad A_i \in P_j$$

Let A_i denote the accessibility degree of the building ($i = 1 \ldots m$; where m is the number of parks). The accessibility of building i to a given park j ($j = 1 \ldots n$; where n is the number of parks) – the number of sq. m of park that each person in the service range of park j receives – is calculated with S_{p_j} representing the size of the park and Q_{P_j} representing the number of persons residing within the park's service range. Finally, the accessibility of the building to all the parks to which the building has access is totalled. Thus, A_i is the cumulative size of green space accessible to building i based on the number of parks P_j i.e. $A_i \in P_j$.

THE FINDINGS

Assessment of the allocation of green spaces – An examination of the access that the residents of the two studied cities have to green spaces indicates that most of the population does not have enough green space according to the minimum standards adopted by the Ministry of Interior.[8] In both cities, the criteria of a minimum distance from a park and a sufficient area of green space per capita are not satisfied for about half the population – roughly 50 per cent in Lod and 48 per cent in Ramla. The ratio of unserved population is very high in both cities – 33 per cent in Lod and 26 per cent in Ramla (see Figure 1). This subprovision of green space is the result of inconsistency between the spatial distribution of the population on the one hand and that of green spaces on the other.

Figure 2 illustrates how the inconsistency between the distribution of green spaces and the location of unserved population yields unserved areas in both cities. In Lod, the green spaces are

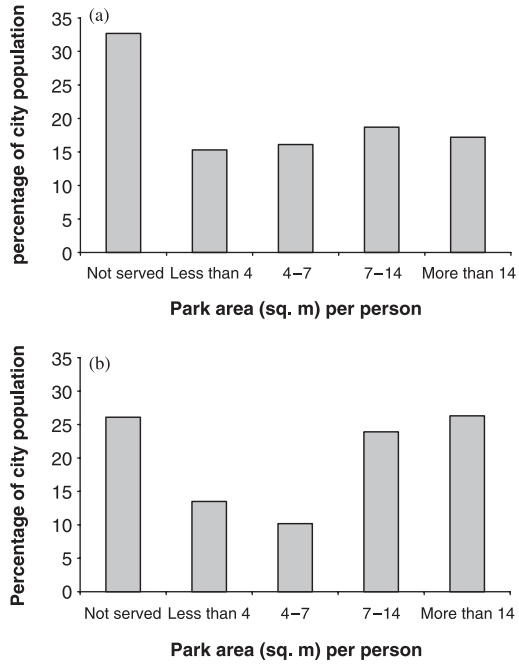

Figure 1. *Levels of accessibility to green space in the cities of (a) Lod and (b) Ramla.*

concentrated in the southern part of town, while the northern part of the city has hardly any. In Ramla, the green spaces are all located in the city centre, while in the outskirts there are none at all. The disparity between the different parts of town reflects an unequal distribution at the city level. At this level, Ramla and Lod offer an average of 13.6 and 12.8 sq. m of green space per capita, respectively, while 17 per cent of Ramla's residents and 26 per cent of Lod's have access to more than 14 sq. m of green space in the shape of neighbourhood parks. In other words, the fact that some of the population is unserved or under-served is the outcome of an unequal distribution rather than a shortage in green spaces. Against this backdrop, an examination of the spatial distribution also makes it possible to address the extent of inequality in allocation and can even serve as a point of departure for planners who set out to accomplish a more egalitarian allocation of green spaces in the city.

Socio-economic status and ethnic identity – The above assessment of the degree of inequality in

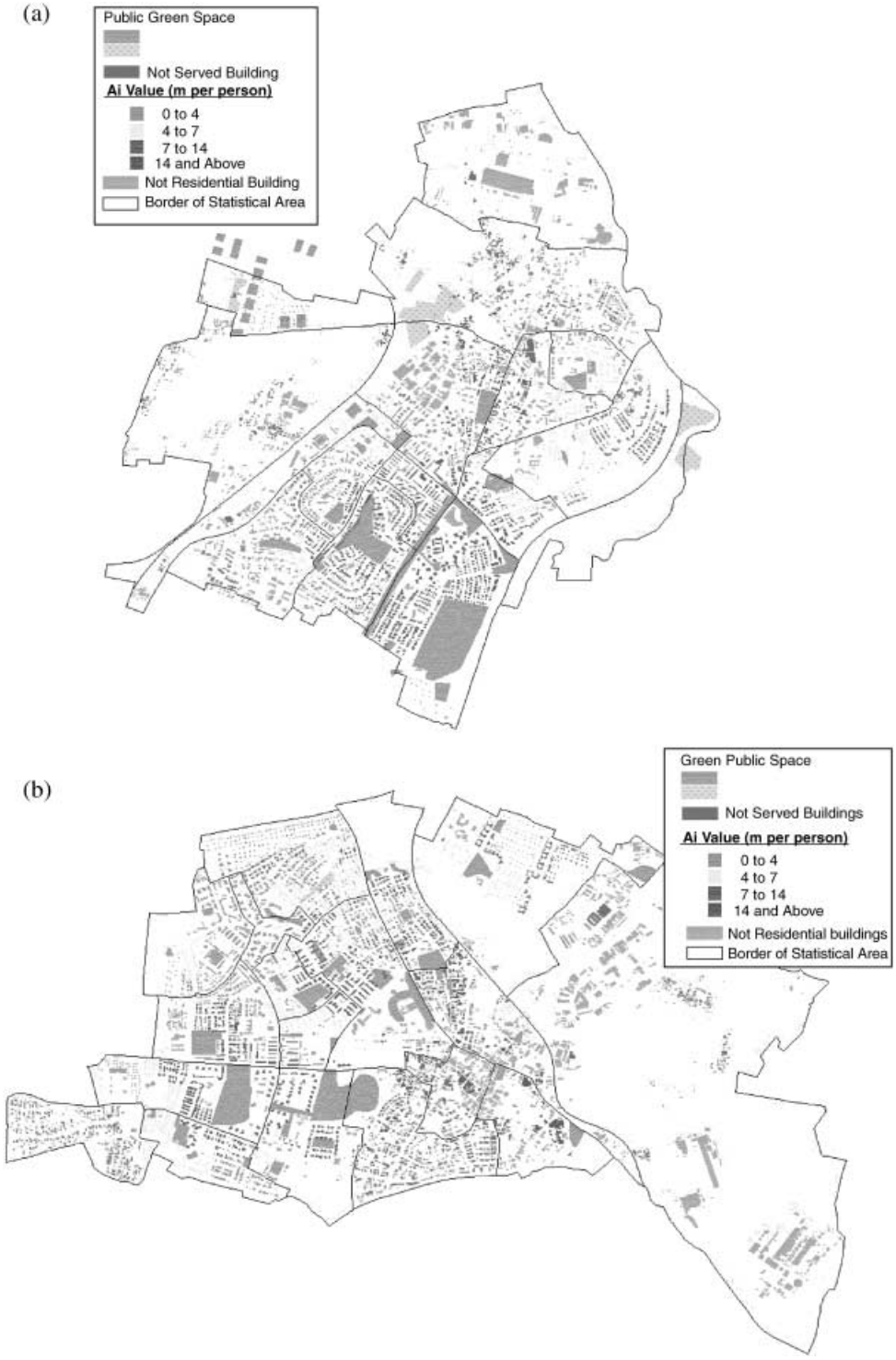

Figure 2. *Access to green space per-building level* (A_i) *in the cities of (a) Lod and (b) Ramla.*

the spatial distribution of green space related to the population distribution, regardless of the social composition of this population. Attention to the socio-economic status and ethnic identity of the population, represented here by the variables of income and the percentage of Jewish residents, can contribute to the analysis of distributive environmental injustice and at the same time explain the very existence of such injustice.

A preliminary examination indicates that in both cities the spatial distribution of income is not equal; this finding is highly significant ($p < 0.001$). The examination was based on the measurement of spatial heterogeneity of income, using the local Geary index of spatial segregation, K1 (Getis & Ord 1996). The variance was measured between the subject building and the ones adjacent to it, using K1 scale. A T-test comparison between the measured spatial distribution of income and the random spatial distribution of income[9] (using K1 values) revealed that the spatial distribution of income in Ramla and Lod is significantly not random ($p < 0.001$).

The Arab population constitutes a minority of 19.6 per cent in Lod and 16.5 per cent in Ramla. A careful examination of the ethnic spatial distribution of the population reveals that most buildings in these cities are ethnically homogenous; as mention above, a homogenous building was defined as one in which at least 80 per cent of the tenants belong to the same ethnic group. According to this definition, 93 per cent of the buildings in Ramla and 95 per cent of those in Lod are ethnically homogenous. In other words, the Jewish and Arab populations in these cities tend to live apart.

In order to study the relation between income levels and ethnic identity, two categories of buildings were defined: those with a Jewish majority and those with an Arab majority. A significant positive correlation was found in Ramla and Lod between the average income of the residents and their ethnic identity (respectively $r = 0.20$ and $r = 0.21$, $p < 0.001$).

Access to green space: socio-economic and ethnic context – Having defined the relevant variables, it is now possible to study the relationship between the distribution of income among buildings and the distribution of the rate of access to green spaces. In other words, it is now possible to check whether a connection exists between unequal access and unequal income levels. The access variable (A_i) represents ordinal values of apartment buildings according to the amount of green space available to each tenant, as follows: 0 sq. m (an unserved building that is more than 250 metres away from the nearest green space); 0–4 sq. m; 4–7 sq. m; 7–14 sq. m; and 14 sq. m or more.

Generally, it was found that in both cities the average income in buildings within the service range of parks (more than 0 sq. m per capita according to the A_i index) exceeds the average income in unserved buildings. In Ramla, the average income in buildings with access to green space is 31 per cent higher than that in buildings with no access; in Lod the difference is 57 per cent. The correlation between the average income per household in a given building and the access that this building has to green space is also significant. The correlation between the access that a building has to green space (A_i) and the average income in that building is 0.172 in Lod and 0.139 in Ramla ($p < 0.001$), which reflects a statistically significant (albeit weak) correlation between these two variables. In other words, in these two cities the more affluent population has greater access to green space.

A significant positive correlation was found between the access to green space and a Jewish majority of tenants in the building (0.47 in Lod and 0.44 in Ramla, for both $p < 0.001$). A significant negative correlation was found between the access to green space and an Arab majority in a building (-0.51 in Lod and -0.46 in Ramla, for both $p < 0.001$). In other words, the Jewish residents of Ramla and Lod have much more access to green space than their Arab neighbours. Interestingly, as in the case of income levels, here too the degree of correlation in both cities is surprisingly similar.

Figure 3 illustrates the distribution of access to green space in Lod and Ramla as related to ethnic identity. It is clear to see that in both cities most buildings with an Arab majority have no access to green space (64% in Lod, 71% in Ramla). The ratio of Jewish buildings with no access to green space is much lower (13% in Lod, 19% in Ramla). In Lod, the percentage of buildings that have access to more than 14 sq. m per capita is twice as high among buildings with a Jewish majority.

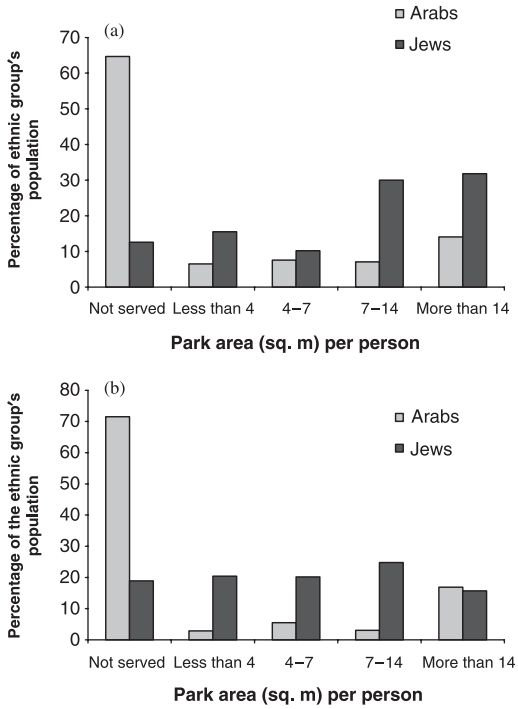

Figure 3. *Levels of accessibility to green space by ethnic identity in the cities of (a) Lod and (b) Ramla.*

The correlation between income and ethnic identity in Ramla and Lod calls for a consideration of the connection between these variables and access to green space. We used stepwise regression in order to check how the combination of social status and ethnic identity influences the level of access to green space. In this examination, the access variable A_i served as the dependent variable and the average income per household in a given building and the ethnic identity of the majority of the tenants, as defined above, served as independent variables. In both cities, the first variable entering the regression equation was that of ethnic identity. In Ramla, R^2 between the access variable and the ethnic identity variable is 0.214; once the income variable is introduced, R^2 becomes 0.217. In other words, the change in the explained variance following the introduction of the income variable is minute ($R^2 = 0.003$). The picture in Lod is similar; R^2 between the access variable and the ethnic identity variable is 0.261 and 0.266 with the income variable added. Namely, the change in the ratio of explained variance that can follow the introduction of the income variable is minimal in the case of Lod as well ($R^2 = 0.005$). In addition, the β value (the slope coefficient in standard values) in the regression equations of the two cities is greater by far for the ethnic identity variable than for the income variable (in Ramla: $\beta_{ethnic} = -0.452$ and $\beta_{income} = -0.055$; in Lod: $\beta_{ethnic} = -0.496$ and $\beta_{income} = -0.073$). This finding clearly shows that the influence of the spatial distribution of the ethnic identity variable on the distribution of access to green space is much greater than that of the distribution of income. The ratio between these distributions at the building level means that ethnic polarisation is the dominant factor in explaining not only the distribution of the population across buildings, but also the distributive environmental injustice in these two cities.

Differential access to green space in Ramla and Lod is thus consistent with the ethnic division and with the socio-economic division, albeit to a lesser degree. It also transpires that the inferior access that low-income earners have to green space is due mainly to their ethnic identity. It is interesting to note that despite the differences between the two cities, there are great similarities in the rates of ethnic and socio-economic divides and in the differential access to green spaces, which was found to correlate with the rate of polarisation. This fact attests to the institutionalisation of distributive environmental injustice in cities where ethnic polarisation is dominant.

These findings support previous studies that addressed the overlapping between socio-economic status and ethnic identity in the stratification of the social structure in Israel and the dominance of ethnic identity in this structure (Smooha 1990; Roman & Weingrod 1991; Portugali 1993; Mautner 2000; Yiftachel & Yacobi 2003). In other words, this study reaffirms the finding that the socio-economic inferiority of the Arab minority in Israel is interconnected with the non-egalitarian, ethnically-stratified structure of the labour market (Lewin-Epstein & Semyonov 1993). The findings also indicate that resources are unequally allocated between Arab and Jewish residents not only at the city level but within mixed cities as well. In this respect, the unequal accessibility of green spaces to Jews and Arabs in Ramla and Lod can be explained by the

strong residential segregation in both cities. Namely, a clear distinction between Arab and Jewish areas within the city facilitates institutional discrimination against Arab residents and results in unequal spatial allocation of public resources.

CONCLUSIONS

This paper illustrates the potential that a high level of detail represents for the evaluation of distributive environmental injustice in the allocation of public services in general and of the differential access that social groups have to such resources in particular. Most methods evaluate the accessibility of public services to a given population based on the accessibility administrative areas where this population constitutes the majority. The novelty in the methodology proposed in this paper, which works with building-level data, is that it evaluates the accessibility of public services to a given population based on the access that each individual in the group has to the studied services.

An implementation of this methodology has revealed that in Ramla and Lod, green space is more accessible to the Jewish population than to the Arab population and to higher-income earners over low-income earners. However, a comparison between the studied social attributes indicates that the distinction between Jews and Arabs is the most prominent factor in unequal access to green space. Moreover, the differential access that different income groups have to green space is explained mainly by the correlation between ethnic identity and income levels in these cities. In the case at hand, then, the ethnic context of distributive environmental injustice is more pronounced. These findings dovetail with previous studies of the relationship between socio-economic status and national-ethnic identity in Israel, and especially with the concept of 'ethnoclass' proposed by Yiftachel & Yacobi (2003), which was aplied to the city Lod and results in a conclusion for 'the need of planning to rise above narrow ethnocentric considerations in order for the "mixed city" to prosper as the home for all communities' (Yiftachel & Yacobi 2003, p. 673).

An accessibility evaluation that is based on data at a building-level resolution is essential when considering urban services such as city parks, which have a relatively limited range of service. The results obtained in this study clearly illustrate that a shortage in public resources cannot be blamed for unequal access; rather, the problem is one of unequal allocation. A more egalitarian distribution of the available green space in Ramla and Lod would have enabled many of the residents to enjoy a sufficient amount of green space within reasonable walking distance. Although the results of this study only pertain to green spaces within the immediate vicinity, they can nevertheless serve environmental organisations and planning agencies as a powerful tool in pushing for more balanced and fair allocation of urban services in these cities.

Notes

1. Until the establishment of the State of Israel, Ramla and Lod were Arab towns. After Israel was founded, Jewish immigrants settled there, the Arab population became a minority and a relatively clear geographic partition emerged between the two social groups. To date, 19.6 per cent of the population in Lod and 16.5 per cent in Ramla is Arab.
2. Principle 9 of Agenda 21 (United Nations 1992):

   > States should cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge.

   Principle 10 of Agenda 21:

   > Each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities.

3. Access to environmental information (UNECE 1998):

   > [C]itizens must have access to information, be entitled to participate in decision-making and have access to justice in environmental matters (Article 4).

4. The Ministry of Interior's guidelines for allocation of green spaces (Ministry of Interior 2002) do not explicitly address the distance parameter; they only discuss the types and size of public parks based

on a geographic breakdown of neighbourhood, quarter and city, and on the size of the population. For example, the guidelines stipulate at least 5 sq. m of park per capita in existing neighbourhoods and 7 sq. m in planned neighbourhoods.

5. Access to this data is limited due to privacy rights. The analysis is therefore conducted on a computer in a designated office at the Central Bureau of Statistics. Data from this computer cannot be copied, printed out or e-mailed without permission.
6. The data used in this study did not refer to disability, unemployment and other allowances, as well as income from other sources such as rent or retirement benefits.
7. The classification was as follows: Jews, Arabs (Muslims, Christians and Druze) and others (persons whose religion is not defined by the database). This study only considered the Jewish and Muslim groups, as defined above. The group of 'others' was not taken into account, since it only constitutes less than 0.5 per cent of the population in each of the cities.
8. Since there is a very high correlation between the two variables – Arab Buildings and Jewish Buildings in calculating the regression, we only used the first.
9. In order to obtain the random spatial distribution, all average incomes of all apartment buildings in town were pooled together and redistributed randomly between the buildings. The mean K1 values of the random distribution in Ramla and Lod are 0.97 and 1.1 respectively, while the K1 value of the real distribution in both cities is 0.85 only.

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