COVID-19 risk indices per municipality and metropolitan municipality planning region

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Introduction

In order to tackle the COVID-19 pandemic efficiently, all spheres of government need to prioritise the locations where interventions are most needed. The task of determining where interventions and support should be provided is complicated and ideally requires real-time data and well-developed models. South African models are still being refined, but until they are available, potential risks can be explored at a variety of geographic scales in order to support the initial responses to COVID-19. GCRO has developed some analysis to help understand risk at different geographic scales. The GCRO's March 2020 Map of the Month explored risk at the ward level and an additional Insight which relates risk indices to population density in Gauteng highlighted the importance of sub-ward level circumstances. The purpose of this Insight is (1) to present different COVID-19 risk levels at the municipal level in Gauteng, and (2) between the different planning regions in the three metros (Ekurhuleni, Johannesburg, and Tshwane). This could help each metro to further understand and prioritise COVID-19 responses in terms of where efforts can be focused and what types of efforts might be required.

The two indices used in this Insight are explained in more detail in the GCRO's March 2020 Map of the Month. The average level of risk is presented in the figures and maps below as a percentage out of 100. In short, the first index, an index of risk factors for maintaining social distance and preventative hygiene, considers the percentage of respondents who live in crowded dwellings; have no access to flush toilets or piped water; usually use public healthcare facilities; do not have access to electronic communication; and rely heavily on public transport. The provincial average of this first index is 24%. The second index is an index of risk factors for health and social vulnerability during an outbreak or broader shutdown. This index considers the percentage of respondents who have poor or very poor health; have no medical insurance; face potential hunger; have concerning pre-existing health conditions; find it difficult to save money and failed to get healthcare when they previously needed it. The provincial average of this second index is 39%.

Average risk per municipality in Gauteng

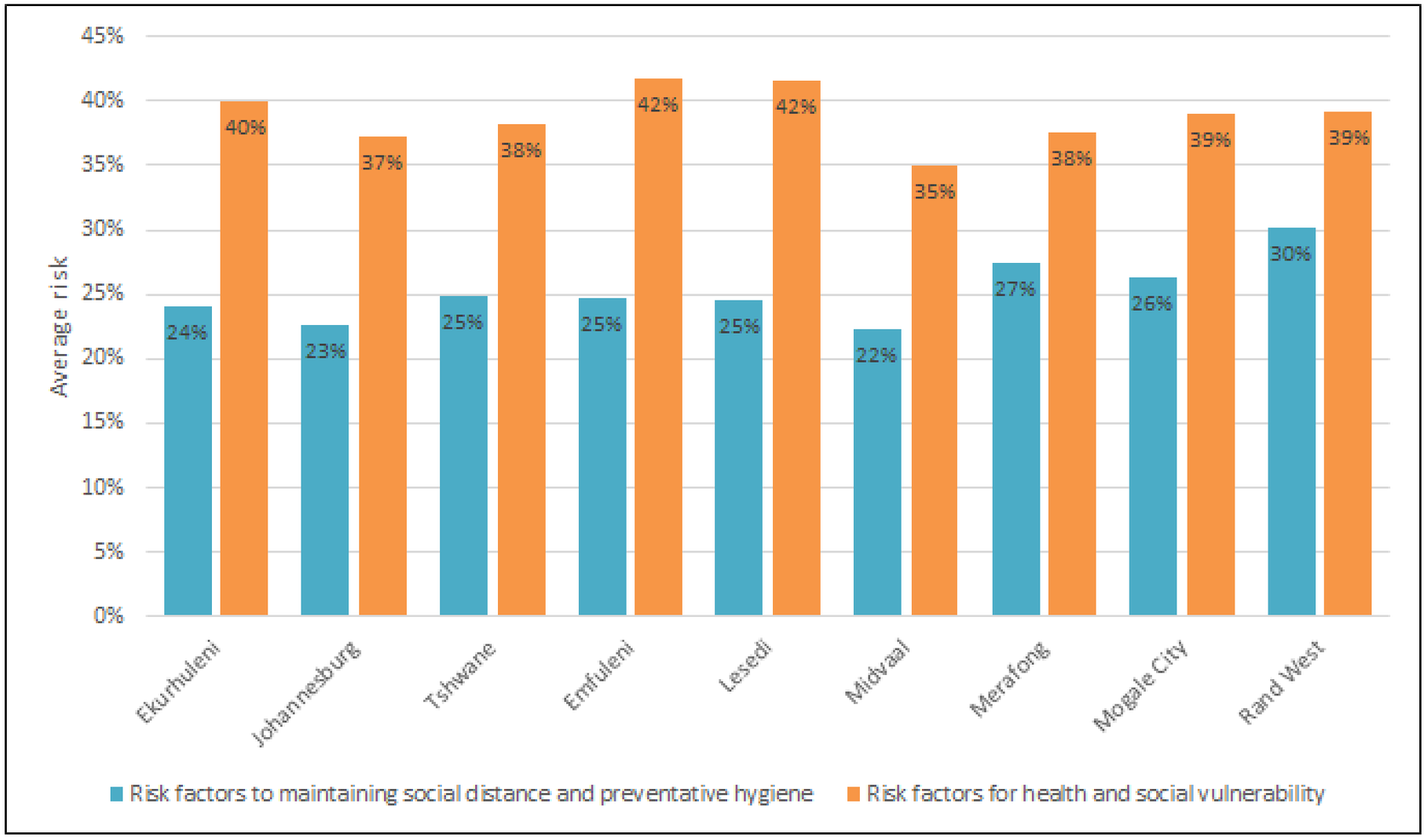


Figure 1: Average risk per municipality in Gauteng

The average risk at the municipal level for maintaining social distance and preventative hygiene is relatively even among most municipalities in Gauteng (blue in Figure 1).

In the first index, Rand West has the highest average risk (30%), followed by Merafong (27%). Risk levels in both of these municipalities are above the provincial average. Midvaal (22%) and Johannesburg (23%) have the lowest social distance and preventative hygiene risk levels.

The average municipal level risk for health and social vulnerability (index 2) varies somewhat more among municipalities in Gauteng (orange in Figure 1).

In this second index, Emfuleni and Lesedi (both 42%) have the highest average risk and are substantially above the provincial average, while Midvaal (35%) and Johannesburg (37%) have the lowest health and social vulnerability risk.

Average risk per metro planning region in Gauteng

The average risk levels on both indices tend to vary substantially within the metros (Figure 2), with the possible exception of average risk levels for maintaining social distance and preventative hygiene in Ekurhuleni. The variation between planning regions could be attributed to the fact that many planning regions are relatively homogeneous in terms of their settlement types and socio-economic status. For example, Region B in Johannesburg is primarily an upper class suburban region while Region F in Johannesburg is primarily peri-urban, with large townships and is home to a relatively poorer population. Table 1, which serves as an accompaniment to Maps 1 and 2, provides some examples of the areas that are in the planning regions with the highest and lowest average risk levels.

Region 7 in Tshwane (44%) has the highest risk in terms of maintaining social distance and preventative hygiene (blue in Figure 2). However, eight other planning regions in the metros have risk levels that are above the provincial average. These include Regions C, E and F in Ekurhuleni; Regions A and F in Johannesburg as well as Regions 1, 2 and 5 in Tshwane.

In terms of index 2, Region 1 in Tshwane (45%) has the highest risk for health and social vulnerability (orange in Figure 2). There are a further six planning regions in the metros that have risk levels above the provincial average. These include Regions C, E and F in Ekurhuleni; Region F in Johannesburg as well as Regions 1 and 7 in Tshwane.

Even though some regions have below average risk levels on both indices, many low-risk regions still include neighbourhoods where factors like high population density, weaker access to services, relatively lower socio-economic status and greater reliance on public healthcare facilities could increase localised risk and these neighbourhoods should therefore be monitored carefully.

Average risk per metro planning region in Gauteng

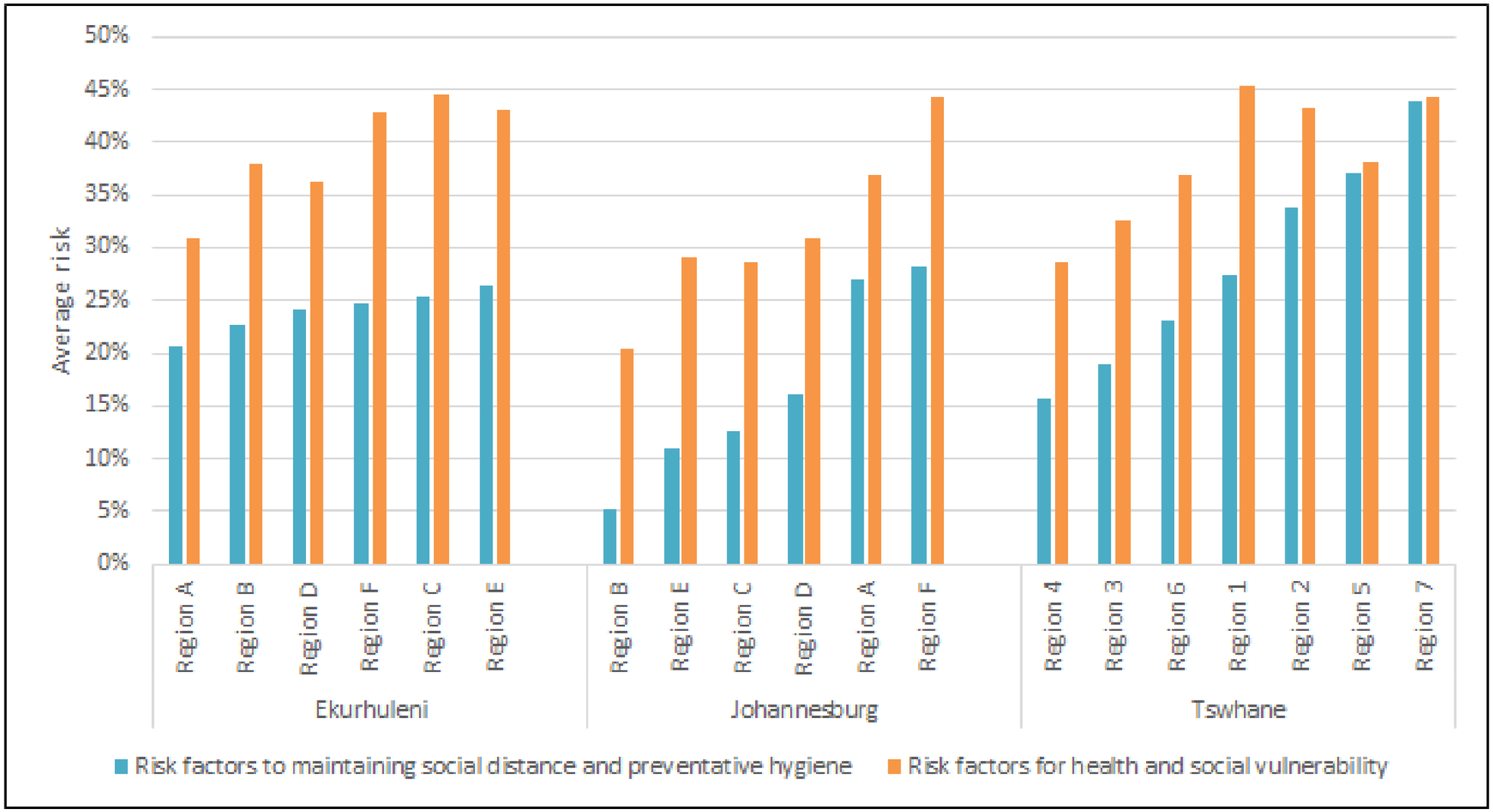
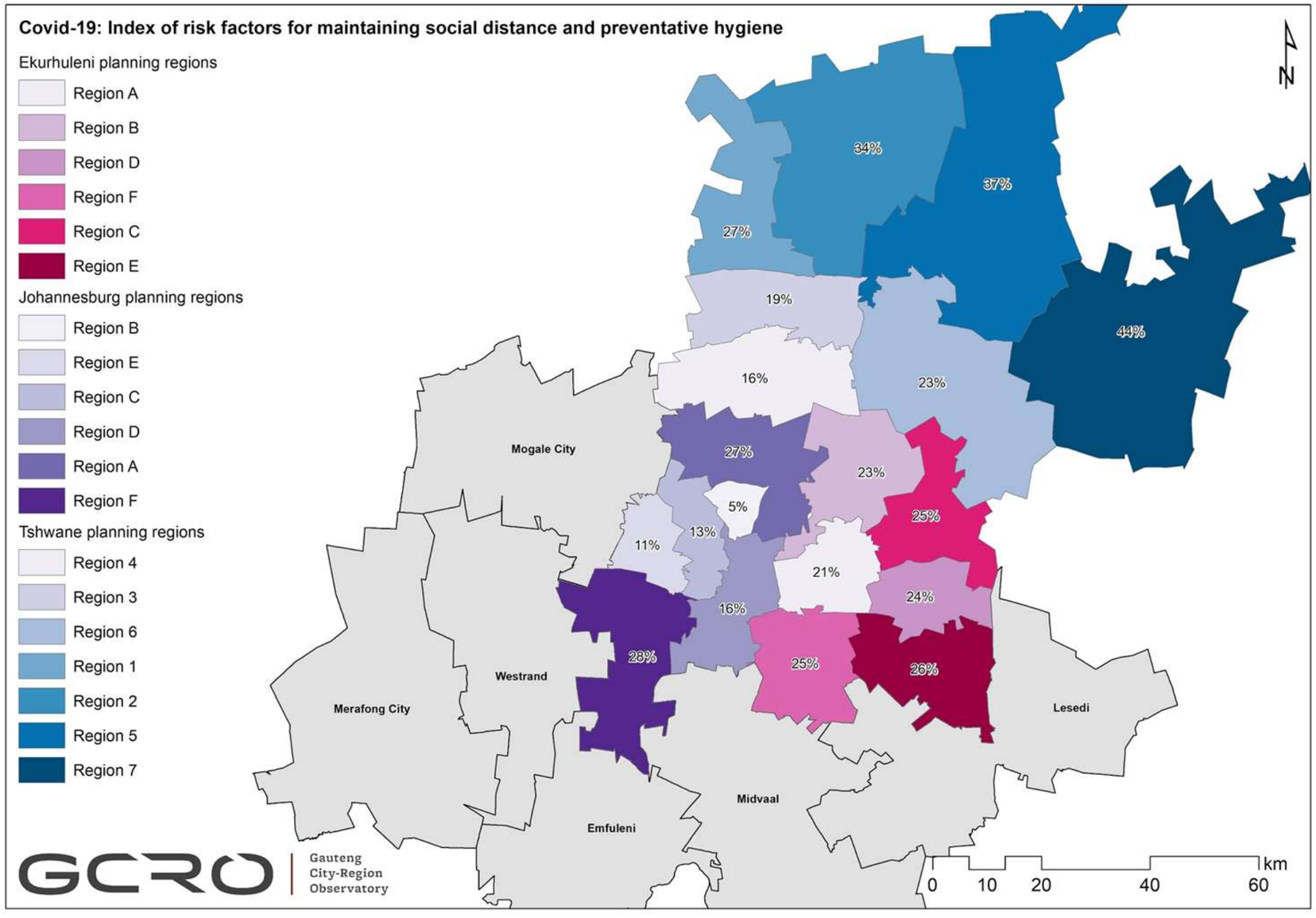


Figure 2: Average risk per metropolitan municipality planning region in Gauteng

Average risk per metro planning region in Gauteng

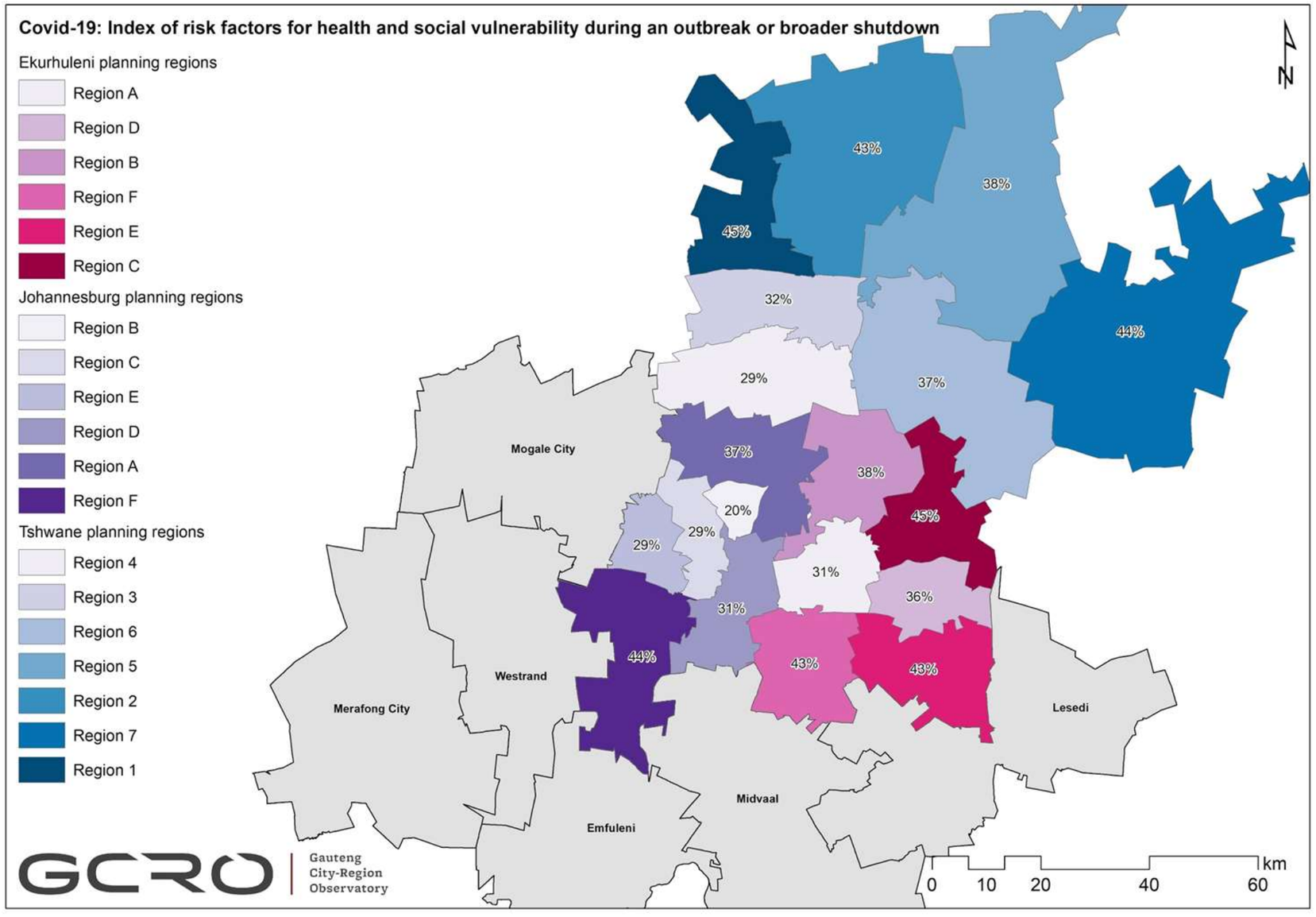


Map 1 illustrates the spatial distribution of risk factors in the first index between planning regions, within each metro.

Planning regions with the highest risk tend to be located on the periphery of the three metros and include peri-urban landscapes or large townships. Lower-risk planning regions tend to be centrally located and include suburban landscapes.

Map 1: Index of risk factors for maintaining social distance and preventative hygiene, per metro planning region

Average risk per metro planning region in Gauteng



Map 2: Index of risk factors for health and social vulnerability, per metropolitan municipality planning region

Map 2 illustrates the spatial distribution of risk factors in the second index between planning regions, within each metro. The patterns on Map 2 are very similar to the patterns in Map 1.

When comparing Map 1 and Map 2, it is evident that some planning regions are consistently identified as regions with the highest or lowest risk levels on both indices in the respective metros. For example, Region A in Ekurhuleni, Region B in Johannesburg and Region 4 in Tshwane have the lowest risk levels on both indices. Region F has the highest risk levels on both indices in Johannesburg.

Average risk per metro planning region in Gauteng

Table 1: Examples of main places and neighbourhoods in planning regions with the highest or lowest risk levels.

Index of risk factors		**Ekurhuleni**	**Johannesburg**	**Tshwane**
Index for maintaining social distance and preventative hygiene (Map 1)	Region with the *highest* risk	Region E (26%) [Tsakane, Duduza, Nigel]	Region F (28%) [Soweto, Lenasia, Ennerdale, Orange Farm]	Region 7 (44%) [Bronkhorstspruit, Zithobeni, Ekangala]
	Region with the *lowest* risk	Region A (21%) [Bedfordview, Germiston, Boksburg, Kempton Park]	Region B (5%) [Bryanston, Morningside Sandton]	Region 4 (16%) [Centurion, Laudium, Olievenhoutbos]
Index of risk of health and social vulnerability during an outbreak or broader shutdown (Map 2)	Region with the *highest* risk	Region C (45%) [Rynfield, Daveyton, Benoni agricultural holdings]	Region F (44%) [Soweto, Lenasia, Ennerdale, Orange Farm]	Region 1 (45%) [Soshanguve, Mabopane, Ga-Rankuwa, Akasia]
	Region with the *lowest* risk	Region A (31%) [Bedfordview, Germiston, Boksburg, Kempton Park]	Region B (20%) [Bryanston, Morningside Sandton]	Region 4 (29%) [Centurion, Laudium, Olievenhoutbos]