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Socioeconomic, demographic, spatial and ethnic inequalities in environmental exposure in the municipalities of Fushë Kosovë/Kosovo Polje and Obiliq/Obilić

An exploration of social and environmental vulnerability based on field survey data

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ABSTRACT

This report gives a first assessment of the scale of environmental inequalities in Obiliq/Obilić and Fushë Kosovë/Kosovo Polje, and the role of socioeconomic, demographic, spatial and ethnic determinants in creating these inequalities. The analysis is based on a field survey and focuses on environmental vulnerabilities in relation to housing, water/hygiene/sanitation, environmental conditions and affordability constraints.

The findings show that there are marked inequalities in environmental disadvantage. The greatest inequalities are associated with socioeconomic and ethnic determinants, but spatial and demographic determinants also play a role. Most frequently, Roma, Ashkali and Egyptian (RAE) ethnicity, as well as low income and poor education, are identified as the strongest determinants of increased environmental disadvantage. Yet a range of environmental disadvantages is identified that affect large population groups as well.

The report helps to identify potential target groups for social and environmental action and presents a range of examples of the variability of environmental inequalities and vulnerabilities. It shows how environmental equality and vulnerability can be assessed in methodological terms, and emphasizes the need for detailed analysis of inequalities and the most vulnerable population groups before action targeted at specific groups is determined.

Keywords

ENVIRONMENTAL HEALTH
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Abbreviations

AF	affordability (score, cluster)
CI	confidence interval
CVA	Community Vulnerability Assessment
EE	environmental exposure (score, cluster)
EQLS	European Quality of Life Survey
HDR	Human Development Report
HS	housing services (score, cluster)
KAS	Kosovo Agency of Statistics
KEK	Korporata Energjetike e Kosovës (Kosovo Energy Corporation)
OR	odds ratio
RAE	Roma, Ashkali and Egyptian
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNKT	United Nations Kosovo Team
UNV	United Nations Volunteers
WHO	World Health Organization
WHS	water/hygiene/sanitation (score, cluster)

Acknowledgements

This report presents the results of environmental inequality and vulnerability analyses based on a Community Vulnerability Assessment (CVA) which was carried out in 2013 in the context of a United Nations Kosovo Team (UNKT) project, "Building a better future for citizens of Fushë Kosovë/Kosovo Polje and Obiliq/Obilić".[1] The UNKT project partners were the United Nations Development Programme (UNDP), United Nations Volunteers (UNV), United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA) and the Regional Office for Europe of the World Health Organization (WHO). WHO gratefully acknowledges the input and support of UNDP in producing this report.

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[1] http://www.unkt.org/building-a-better-future-for-citizens-if-fushe-kosovekosovo-polje-and-obiliqobilic-participation-protection-and-multiethnic-partnerships-for-improved-education-health-and-sustainable-livelihoods, accessed 26 July 2015.

Executive summary

This report provides evidence on the magnitude of environmental inequalities in the municipalities of Obiliq/Obilić and Fushë Kosovë/Kosovo Polje, and the relevance of socioeconomic, demographic, spatial and ethnic determinants in understanding these inequalities. The findings are based on a field survey that collected self-reported information on more than 9000 individuals. Various restrictions regarding sample size, questionnaire design and data validity need to be acknowledged. In addition, the results may not necessarily be representative for other regions of Kosovo.[2]

Data analyses focused on four clusters of variables related to specific aspects of environmental and social vulnerability:

- housing services (covering, for example, housing amenities (fridge, stove), beds for each resident, electricity supply);
- water/hygiene/sanitation conditions (covering, for example, toilet, shower/bath, sewage system connection, water supply, water quality);
- environmental exposure (covering, for example, housing condition, crowding, energy use for cooking/heating, quality of air, contamination of soil);
- affordability constraints (covering, for example, financial situation, problems affording food, water and energy, household needs most often sacrificed, problems affording medicine).[3]

The analyses aimed to identify inequalities and vulnerabilities for the four clusters in relation to socioeconomic determinants (such as income, employment and education), demographic determinants (age, sex and household composition), spatial determinants (urban versus rural residence, municipality) and ethnicity.

Priorities of environmental disadvantage

The share of the total sample that is exposed to a certain environmental disadvantage is highly variable. The analysis has identified some key challenges of environmental disadvantage that are valid for the total population and not only for specific population groups. Key challenges affecting large population groups relate, for example, to:

- perception of quality (49.9%) and quantity (23.3%) of drinking-water supply as inadequate;
- lack of piped water supply in the dwelling (47%);
- unaffordability of basic services such as adequate water (47.6%) and energy (55.9%);
- use of solid fuels (wood and coal) as main energy source for heating (79.3%) and cooking (70.4%);

[2] All references to Kosovo should be understood in the context of UN Security Council resolution 1244 (1999).

[3] In this report the term “affordability” generally has the meaning “ability to afford” – the capacity to pay for items such as food and clothing and for services such as water and energy supply.

- perceived air pollution (60.7%) and reported environmental contamination with toxic substances (50.5%) in the neighbourhood area.

Environmental inequalities and their main determinants

For specific population groups or spatial settings, some environmental disadvantages may exist that are not a priority issue for the full sample. Such environmental inequalities in exposure to potentially harmful conditions are found for all variables related to housing services, water/hygiene/sanitation, environmental quality and affordability. There are three key points to be made on the magnitude of environmental inequalities.

The strongest inequalities in environmental disadvantage are to be found in relation to socioeconomic determinants (especially income and education) and ethnicity

Very high inequalities in environmental and infrastructural conditions are found especially in relation to housing equipment for hygiene, sanitation, cooking and heating; often these do not affect large parts of the population, but they can be a major concern in specific ethnic or socioeconomic population subgroups. This leads to rather high relative inequalities, such as lack of electricity supply in the dwelling with an inequality ratio of 100 (lack of electricity is reported by only 0.1% of individuals with university education compared to 10% of individuals with no education); or lack of a bathroom in the dwelling with an inequality ratio of 68 (reported by only 0.3% of Albanian households compared to 20.2% of Roma, Ashkali and Egyptian (RAE) ethnicity households).

Environmental inequalities are also to be found in relation to spatial determinants (municipality and urban–rural residence)

Environmental inequalities are found between urban and rural settings as well as between the two municipalities of Obiliq/Obilić and Fushë Kosovë/Kosovo Polje, but they tend to be weaker than environmental inequalities associated with socioeconomic or ethnic determinants. For example, solid fuel use for cooking in urban versus rural areas shows an inequality ratio of 2.0 (coal and wood are used twice as often in rural areas (84.7%) than in urban areas (42.8%)). This indicates that comparatively low inequality ratios can, in absolute numbers, outweigh the effect of high relative inequalities within a smaller population subgroup.

Environmental conditions can be extreme in settlements located close to major contamination sources. One example is the strongly increased reporting of environmental pollution in settlements located close to the KEK[4] power plant and mining area.

Combining the impact of socioeconomic, demographic, ethnic and spatial determinants creates "multiple disadvantage" and strongly increases the observed environmental inequalities

Disadvantage tends to be clustered and vulnerable population groups are usually affected by various challenges. The combination of various determinants therefore strongly increases the percentage of the respective population exposed to environmental disadvantages. For example, inadequate housing affects 11.6% of the total population, but the combination of various determinants (such as rural residence, RAE

[4] Korporata Energjetike e Kosovës (Kosovo Energy Corporation).

ethnicity, lack of education and unemployment) increases the percentage within that population subgroup affected by inadequate housing to 87.9%.

Demographic determinants such as sex, age or household composition play only a minor role in the case of environmental inequalities. For spatial determinants there is some ambiguity, as the environmental disadvantage can be associated with rural as well as urban location and depends on the environmental disadvantage considered (for example, housing-related disadvantage is a more rural challenge, while low affordability is a more urban challenge).

Health impacts of social and environmental conditions

People suffering from specific diseases or health outcomes are often more likely also to be exposed to inadequate environmental conditions. This association between increased health burden and increased environmental burden is valid for all environmental disadvantage areas (housing services, water/hygiene/ sanitation, environmental exposure and affordability). However, as a consequence of the cross-sectional design of the survey, the results cannot provide causal relationships. In addition, data are affected by low case numbers and the unknown influence of other relevant factors. It is important to point out that health outcomes are self-reported.

Inadequate conditions, especially with respect to housing and affordability, are associated with an increased self-reporting of bad health, but the association is not very strong. However, almost a quarter (23.2%) of the population with bad self-reported health status is highly vulnerable to environmental and social problems. Thus, while the results do not prove that bad environmental conditions directly cause health problems, they do show that individuals in bad health conditions are more often challenged by high levels of environmental and social vulnerability.

The interplay of social and environmental vulnerability in relation to self-reported health status generates four key findings.

- Socioeconomic and demographic variables are associated with a very strong increase in bad self-reported health status, especially in relation to advanced age and lack of education but also to rural residence and financial problems.
- Only a few specific environmental disadvantage parameters (for example, solid fuel use, perception of water quantity as inadequate, water affordability problems, not having a bed for each household member) are associated with an independent increase in bad self-reported health status when accounting for the influence of socioeconomic, demographic, spatial and ethnic variables.
- Generic indicators of environmental vulnerability as defined by cluster scores for inadequate housing services, inadequate water/hygiene/sanitation and inadequate environmental conditions are not associated with an increase in bad self-reported health status when the influence of socioeconomic, demographic, spatial and ethnic variables is accounted for.

- Inadequate affordability is associated with an increase in bad self-reported health status; this impact is reduced by socioeconomic, demographic, spatial and ethnic variables but remains statistically significant.

Overall, environmental determinants are much more weakly associated with variations in self-reported health status than socioeconomic, spatial or demographic determinants, although some environmental disadvantages show a significant and independent impact. The clearest association with bad self-reported health status is found for age and education, while ethnicity – one of the major determinants of environmental inequalities – is not associated with variations in self-reported health status at all.

Conclusion and potential interventions

The main conclusions relevant for policy-makers in the field of social protection, environmental management and public health are as follows.

- Socioeconomic determinants (especially income and education), demographic determinants and ethnicity have a strong impact on differences in environmental exposure between population subgroups.
- Spatial determinants such as urban or rural residence, municipality and settlement area have a further impact on the occurrence of environmental inequalities.
- Socioeconomic and demographic determinants (especially age and education) are associated with differences in self-reported health status, while ethnicity and sex are not.
- Some environmental parameters (especially related to water supply and use of solid fuels) show an independent association with self-reported health status.
- Overall, environmental determinants show a less strong association with variations in self-reported health status than socioeconomic and demographic determinants.

Given the limitations of the data, future work is necessary in order to confirm the magnitude and potential health consequences of social and environmental vulnerability presented in this report and to assess whether the findings are applicable to other settlements within Kosovo.[5]

Based on the results presented in the report, two main action areas are suggested to reduce environmental inequalities and related health outcomes.

Interventions with a social focus: investing in people and society

Interventions with a social focus would include, for example, support for basic education and vocational training, employment campaigns and support for low-income jobs, social support schemes, better integration of marginalized ethnic groups in civil society, and active outreach of health system services to disadvantaged groups.

[5] All references to Kosovo should be understood in the context of UN Security Council resolution 1244 (1999).

Social interventions to mitigate and reduce environmental and social inequalities should therefore come with a strong focus on target groups where empowerment, education and professional development are most needed in order to achieve better integration into civil society and the job market and hence improved capabilities for social and financial sustainability.

Interventions with an environmental focus: investing in infrastructure and environmental protection

Interventions with an environmental focus could cover universal action on environmental issues, targeted action on environmental inequalities, rural development programmes, urban planning and environmental management, and an increased policy focus on environmental features with the highest health relevance, including water and energy supply.

Infrastructural and environmental interventions are more difficult to target at specific vulnerable groups and need to be combined with specific interventions targeted at specific local conditions or sectoral actions. In addition, urban and rural conditions vary, so action needs to be based on assessments of respective needs.

1 Introduction

This report presents the results of environmental inequality and vulnerability analyses based on a Community Vulnerability Assessment (CVA) carried out in 2013 in the context of a United Nations Kosovo Team (UNKT) project "Building a better future for citizens of Fushë Kosovë/Kosovo Polje and Obiliq/Obilić".[6]

The UNKT project aimed to empower and mobilize different communities in the targeted municipalities of Fushé Kosovë/Kosovo Polje and Obiliq/Obilić by identifying and providing support to the most vulnerable groups. The UNKT project also sought to identify sustainable interventions to decrease the vulnerability and human security risks that these communities face. Through multisectoral interventions, the project aimed to improve the living conditions of the communities concerned and to encourage a more tolerant and multiethnic climate, with a view to promoting self-reliance, participation, protection, education, health and sustainable livelihoods.

The project tackled three critical challenges with respect to human security:

- stimulating livelihood opportunities for those least able to participate in the labour market (with particular focus on those of Roma, Ashkali and Egyptian (RAE) ethnicity, youth and women) by promoting work readiness, skill development and greater social protection for the poor, excluded minorities, women and young people;
- improving the health prospects of those most at risk from environmental and lifestyle hazards in two of Kosovo's most polluted and poorest municipalities;[7]
- providing immediate benefits to communities (such as support for livelihood generation), complemented by longer-term preventative measures in health, education and participatory decision-making to ensure sustainability through capacity development, partnership and ownership.

As two of Kosovo's least developed municipalities, Fushë Kosovë/Kosovo Polje and Obiliq/Obilić are both typical of Kosovo-wide human security issues and specifically challenged by the uniqueness of their multiethnic composition. Whereas many of Kosovo's municipalities have different ethnicities separated into enclaves, these two adjacent, central municipalities (bordering the capital Prishtinë/Priština) have Albanian, Serb and RAE families living together in mixed neighbourhoods. While the task of reconciliation clearly represents a challenge, it also offers a powerful opportunity – provided that it is tackled in a politically sensitive manner – to promote security and development.

The primary human security challenges facing the estimated 80 000 people of Fushë Kosovë/Kosovo Polje and Obiliq/Obilić are:[8]

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[6] http://www.unkt.org/building-a-better-future-for-citizens-if-fushe-kosovekosovo-polje-and-obiliqobilic-participation-protection-and-multiethnic-partnerships-for-improved-education-health-and-sustainable-livelihoods, accessed 26 July 2015.

[7] All references to Kosovo should be understood in the context of UN Security Council resolution 1244 (1999).

[8] http://www.ks.undp.org/content/dam/kosovo/docs/FK_Ob/HSFT_PRODOC.pdf, accessed 31 July 2015.

- economic constriction and poverty;
- limited quality of life due to inadequate management of environmental hazards and to health and education issues;
- tension and discrimination that erodes social cohesion, especially in RAE communities.

The project activities cover the interconnected human security domains described below, and provide the basis for analysis of environmental vulnerability and the socioeconomic, demographic, spatial and ethnic inequalities in environmental exposure presented in this report. The relevant domains are as follows.[9]

Economic
Addressing persistent poverty, long-term unemployment, and ethnic and sex discrimination in the target municipalities to identify immediate work opportunities and better prepare younger generations to join the competitive market economy.

Health
Improving the basic health standards of municipal residents without the economic or social power to make informed health choices; enabling access based on equity for all; mitigating environmental hazards; and improving the capacity of authorities to better target relevant services.

Environmental
Promoting municipal mitigation strategies in two of Kosovo's most polluted and hazardous municipalities,[10] while diminishing the environmental impact of lifestyle choices made by individuals.

To identify the specific needs of vulnerable population groups and minorities, a CVA was carried out to create vulnerability profiles and to determine priority entry points in employment, health, education, social protection services and environmental protection. Reflecting the human security domains covered by the project, the CVA collected data on the social and economic conditions of households and families, as well as their environmental situation and person-specific health data.

This report, based on the CVA database of about 2000 households with more than 9000 individuals, focuses on aspects of human security related to environmental vulnerability and presents survey findings on:

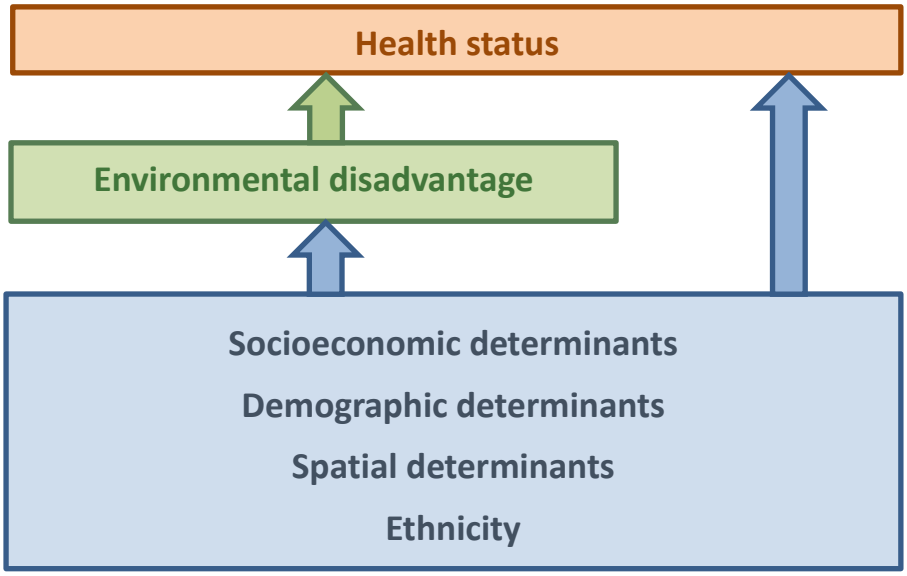
- the frequency and distribution of environmental disadvantage exposure in the municipalities;
- the presence and magnitude of socioeconomic, demographic and ethnic inequalities in environmental disadvantage exposure and the most powerful determinants of environmental vulnerability;
- the most disadvantaged population groups in terms of environmental disadvantage;

[9] http://www.ks.undp.org/content/dam/kosovo/docs/FK_Ob/HSFT_PRODOC.pdf, accessed 31 July 2015.

[10] All references to Kosovo should be understood in the context of UN Security Council resolution 1244 (1999).

- the potential health implications of environmental disadvantage within the given socio-economic, demographic, spatial and ethnic context (see Fig. 1).

Fig. 1. Conceptual approach to environmental inequalities and health



2 Methodology: data preparation and analysis description

This chapter describes the methods used to prepare the CVA database and then to conduct an environmental analysis of it. The original database was provided by the United Nations Development Programme (UNDP) Kosovo office and was based on a field survey subcontracted to a consulting and research agency. A final report on the survey and its methodology is available from the UNDP Kosovo office.[11]

2.1 Database preparation and restrictions

2.1.1 Database cleaning and validation

Analysis was preceded by modifications of the CVA database. These modifications comprise:

- restructuring of the database
- deleting of cases
- changing and recoding of questionnaire variables
- computing of new variables.

Annex 1 provides some information on, and examples of, the database modifications.

2.1.2 Final sample after cleaning and restructuring

Two final and validated databases were produced for the analysis. The total sample database includes 9495 individuals from 1998 households, 51.7% and 48.3% female, and holds information on all residents surveyed. While the person-related data vary in relation to the individual, the data focused on housing and environment are similar for each person of the same household. This database is therefore suitable for analysis of the surveyed population and for inequalities in population exposure to environmental conditions determined by socioeconomic, demographic, spatial and ethnic variables.

The household-level database contains 1998 households and includes only one case per household (representing the person responding to the survey questions). This database is suitable for analysis of household- or dwelling-related issues where the number and characteristics of household members play a less significant role.

2.1.3 Data restrictions and constraints

The database used for the analysis presented in this report has a variety of shortcomings.

The first limitation is due to the fact that all data were collected by questionnaires and thus represent the perception and/or personal opinion of one household member responding to the questions. The data are therefore not objectively measured and cannot be validated. This limitation is doubtless less significant in the

[11] UNDP Community Vulnerability Assessment report 2013. Final draft. IQ Consulting/Social Development Foundation (http://www.ks.undp.org/content/dam/kosovo/docs/FK_Ob/CVA%20Report%2008.08.2013%20final%20April%202014.pdf, accessed 26 July 2015).

case of variables that are less affected by perception (for example, whether a dwelling has electricity or whether a person goes to school or not), but it severely restricts the reliability of data that are either highly subjective (for example, quality of drinking-water or adequate provision of health services) or refer to another household member (for example, health status or security of employment). Furthermore, considerations such as language issues, education level and distrust of both survey and surveyors may have affected the responses given. Regarding the reliability of responses, therefore, it is appropriate to distinguish between (a) data that are dependent on subjective perception (such as perception of air or water quality – unlikely to represent objectively valid information), and (b) data relating to factual and/or quantitative matters (such as employment status or source of drinking-water supply – still affected by some level of uncertainty but likely to provide valid information).

The second limitation relates to the health data, which cannot provide information on disease incidence and/or prevalence levels and are likely to substantially underestimate the real disease burden. This is a consequence of the design of the questionnaire, in which questions on health problems are asked in relation to the whole household rather than to individual residents, and only one illness out of various options has to be selected. Furthermore, diseases and symptoms are mixed and the selected health outcomes are of a general nature (for example, cold, influenza, injuries, high blood pressure, or overall self-reported health status). These outcomes can be brought about by various factors and are therefore not very helpful in assessing the health impacts of environmental conditions; to assess these, more specific diseases caused by environmental variables would be required. Therefore, the data on specific diseases and health symptoms do not allow an assessment of (a) the real association between social and/or environmental factors and health outcomes, or (b) the incidence and/or prevalence of diseases. Instead, the data may give an indication of the relative priority household heads within the sampled population attach to a selection of health problems.

The third limitation is that caution is needed over the reliability of the sample from which the data were derived and hence over the representativeness of the data. The figures are not representative because certain risk groups within the population were intentionally overrepresented in the survey in order to ensure that there were sufficient cases of marginalized groups to allow meaningful analysis (see the survey report for details of the sampling and survey methodology).[12] However, this also means that population data obtained from the survey are affected by artificial sample characteristics and therefore cannot be seen as representative of the population of the two municipalities. On the other hand, the strength of this approach is the opportunity it offers to analyse a sufficient number of cases within the specific target groups.

Table 1 shows the impact of the chosen sampling methodology on some selected population features. It reveals that, compared to municipal data derived from the Kosovo Census of 2011 and other data sources provided by the Kosovo Agency of Statistics (KAS), there is overrepresentation in the survey sample of individuals with RAE and Serbian ethnicity, and of unemployed people. In Obiliq/Obilić, there is also overrepresentation of rural residents. Only the age breakdown is roughly similar to the census data in both municipalities. To put the data in a broader context, the census data for the total population of Kosovo are also provided in Table 1.[13]

[12] UNDP Community Vulnerability Assessment report 2013 (see previous note).

[13] All references to Kosovo should be understood in the context of UN Security Council resolution 1244 (1999).

Table 1. Comparison of municipal data and CVA survey sample characteristics

Ethnicity	Census 2011 [a] Fushë K./K. Polje (%)	CVA survey data Fushë K./K. Polje (%)	Census 2011 [a] Obiliq/Obilić (%)	CVA survey data Obiliq/Obilić (%)	Census 2011 [a] (%)
Albanian	86.9	55.7	92.1	68.9	92.9
Serbian	0.9	7.9	1.3	5.6	1.5
RAE	9.9	36.3	5.9	25.5	2.0
Bosniaks	0.1	0.1	0.3	0.1	1.6
Other	2.2	0.0	0.4	0.0	2.0
Age (years)	Census 2011 [a] Fushë K./K. Polje (%)	CVA survey data Fushë K./K. Polje (%)	Census 2011 [a] Obiliq/Obilić (%)	CVA survey data Obiliq/Obilić (%)	Census 2011 [a] (%)
0–14	28.7	28.1	29.7	28.4	28.0
15–64	65.1	66.5	64.5	66.2	65.3
65 and over	6.2	5.4	5.7	5.4	6.7
Urbanization	Census 2011 [a] Fushë K./K. Polje (%)	CVA survey data Fushë K./K. Polje (%)	Census 2011 [a] Obiliq/Obilić (%)	CVA survey data Obiliq/Obilić (%)	Census 2011 [a] (%)
Rural	46.8	46.6	68.1	83.4	61.7
Urban	53.2	53.4	31.9	16.6	38.3
Unemploy-ment	Census 2011 [a] Fushë K./K. Polje (%)	CVA survey data Fushë K./K. Polje (%)	Census 2011 [a] Obiliq/Obilić (%)	CVA survey data Obiliq/Obilić (%)	LFS 2012 [b] (%)
Unemployed	36.0	59.9	46.0	57.4	30.9

[a] Kosovo Census 2011. Kosovo Agency of Statistics (KAS), Pristina, Kosovo (http://ask.rks-gov.net).

[b] Labour Force Survey 2012. Kosovo Agency of Statistics (KAS), Pristina, Kosovo (http://ask.rks-gov.net).

Acknowledging the limitations of the data and methods, the results presented in this report should be considered as indications of social and environmental vulnerability and their potential associations with health. Future work is recommended to confirm the magnitude and potential health consequences of social and environmental vulnerability presented here and to assess whether the findings are typical of other settlements within Kosovo.[14]

2.2 Data analysis

The data analysis performed is of a descriptive and exploratory nature. It aimed to identify and quantify the variations in environmental conditions for specific population subgroups in the two municipalities, and to assess the potential associations of such environmental differences with social determinants of health and health outcomes.

The aim of the work was not to test pre-existing hypotheses concerning potential inequalities, the respective "disadvantaged" population groups, or the potential health consequences of specific environmental conditions. The results therefore describe the environmental inequalities and their associations with selected health indicators derived from the dataset, but they do not provide indications of causality between environmental conditions and health. Nevertheless, the results could be used to generate hypotheses for further research based on better and more detailed data.

[14] All references to Kosovo should be understood in the context of UN Security Council resolution 1244 (1999).

2.2.1 Data analysis step 1: describing the sample and its features

Before starting statistical analysis, an overview of the sample and its distribution across important socio-economic, demographic, spatial and ethnic determinants was produced, thereby allowing a better overview of the sample characteristics. To this end, significant socioeconomic, demographic, spatial and ethnic variables (such as sex, age, income, education, ethnic background and residential location) were analysed for the total sample to obtain the number of valid values, missing values and percentage distribution across the variable categories. Additionally, all analysed variables were stratified by municipality to achieve an overview of the socioeconomic, demographic, spatial and ethnic distribution between the municipality subsamples.

2.2.2 Data analysis step 2: identifying environmental vulnerability priorities (cluster development)

As a first step in the analysis, four clusters were defined to structure the analysis and to support a conceptual approach to the variety of data contained in the database. The clusters were:

- a housing services (HS) cluster, covering housing amenities as well as energy supply services;
- a water/hygiene/sanitation (WHS) cluster, covering sanitary amenities, water supply, water disposal and water quality;
- an environmental exposure (EE) cluster, covering environmental disadvantages related to accommodation and domestic energy use, and the quality of the residential area with respect to contamination of air and soil and the presence of toxic substances;
- an affordability (AF) cluster, covering economic vulnerability related to income and financial capacities, ability to buy such essentials as food, water and energy, housing expenses, and health-related expenses.

Clearly, some of the clusters contain variables that could also be included in other clusters; this is especially true of the AF cluster variables, which partially overlap with socioeconomic determinants rather than exposure variables. However, the lack of affordability of basic services directly affects the environmental quality of each household and thus shapes environmental disadvantage as much as other conventional environmental characteristics such as water and air pollution.

Frequency distributions and bivariate analyses were performed for all selected variables within the four clusters to provide an overview of the sample situation and to determine the extent to which certain conditions or problems are prevalent. These descriptive analyses were also used to identify some of the key issues of environmental vulnerability that would then be analysed in more detail.

2.2.3 Data analysis step 3: identifying the most vulnerable population subgroups

For the analysis of inequalities in exposure and vulnerability, the environmental priorities identified in step 2 were then analysed in further detail, identifying the population subgroups facing the highest exposure levels. For this work, the most substantial determinants were:

1 Ethnicity

- Albanian, RAE, Serbian

2 Socioeconomic determinants

- self-assessed financial situation of household
- income quintiles
- education level
- employment status

3 Demographic determinants

- age
- sex
- household size (number of household members)
- household composition (household with or without children)

4 Spatial determinants

- municipality (Obiliq/Obilić or Fushë Kosovë/Kosovo Polje)
- residential location (urban or rural).

The analysis was performed on the total database by creating cross-tabulations between each socioeconomic, demographic, spatial and ethnic determinant and a range of selected environmental disadvantages for each of the four clusters. Data tables present the inequalities in exposure to environmental disadvantages (using an "inequality ratio" that quantifies the relative inequality between the most advantaged and the most disadvantaged population group)[15] and the significance level for the result (using chi-square). Special attention was paid to the potential impact of employment, assessing the magnitude of environmental inequality between unemployed and employed population groups.

Further analyses were carried out to assess the impact of multiple disadvantage (combining socioeconomic, demographic, spatial and ethnic determinants) on environmental inequality and to document the increased environmental vulnerability of population subgroups affected by various determinants simultaneously.

The identification of the most vulnerable population subgroups ends with a short section highlighting the spatial aspect of environmental inequalities in relation to pollution hot spots and settlement areas in close proximity to contamination sources.

2.2.4 Data analysis step 4: health impacts of environmental inequality and social vulnerability

The final analyses focused on the potential health impacts of both environmental inequality and social vulnerability and applied some of the health data covered by the survey (mostly self-reported health and vaccination data). The main objective of the analyses was to quantify the impact of environmental inequalities on health within the total population and selected subgroups, and to assess the extent to which environmental

[15] Relative inequality refers to the relative difference in exposure between different population groups. The relative inequality can vary even when absolute inequality of exposure remains the same. For example, if wood use for heating is reported for 10% of urban residents and 20% of rural residents, the absolute difference is 10% and wood use is twice as frequent in rural settings. If wood use for heating is 20% in urban settings and 30% in rural settings, the absolute difference remains the same (10%) but the relative difference changes, from an inequality ratio of 2.0 (indicating double exposure in rural areas) to an inequality ratio of 1.5 (indicating a 50% increase in exposure in rural areas compared to urban areas).

vulnerability may add to the health impact of social vulnerability. This last step in the analysis therefore brought together three variables:

- socioeconomic, demographic, spatial and ethnic determinants
- environmental disadvantage
- health outcomes.

For the health-specific analysis, cross-tabulations on self-reported health status and vaccination coverage were applied, as were logistic regression models. The regression models used self-reported health status as a dependent variable with a binary outcome (bad/very bad versus good/very good self-reported health status) and assessed the impact of environmental variables – separated into the four clusters – on bad self-reported health status. Two models were run for each regression, one including only environmental variables, the other including both environmental variables and covariates (age, sex, urban–rural residence, financial problems, education and ethnicity).

3 Results and findings

3.1 Analysis step 1: sample description

As a basis for data analysis, an overview of the sample and its distribution across important socioeconomic, demographic, spatial and ethnic indicators was produced. In addition, all analysed variables were stratified by municipality to achieve an overview of the socioeconomic, demographic, spatial and ethnic differences between the two municipalities sampled. The results are shown in Annex 2.

The overall sample shows a broadly similar distribution of cases between the two municipalities (45.8% Obiliq/Obilić; 54.2% Fushë Kosovë/Kosovo Polje) and between sexes (51.7% male; 48.3% female). On the other hand, discrepancies exist between the municipalities with respect to ethnic groups; these differences are especially marked in the case of Roma, which account for 21.5% of the sample in Obiliq/Obilić but just 4.2% in Fushë Kosovë/Kosovo Polje, and Ashkali, which account for 29.1% in Fushë Kosovë/Kosovo Polje but just 3.7% in Obiliq/Obilić. Of the surveyed population, 32.1% live in an urban setting, while 58.1% reside in rural areas. However, there is a large difference with respect to urbanization between the municipalities, as Fushë Kosovë/Kosovo Polje tends to be more urbanized (45.6% urban residents) than Obiliq/Obilić (16.1% urban residents). In the case of other demographic and socioeconomic variables (income, education, etc.), the variations between the municipalities appear rather modest and mostly random.

3.2 Analysis step 2: environmental vulnerability priorities and their distribution

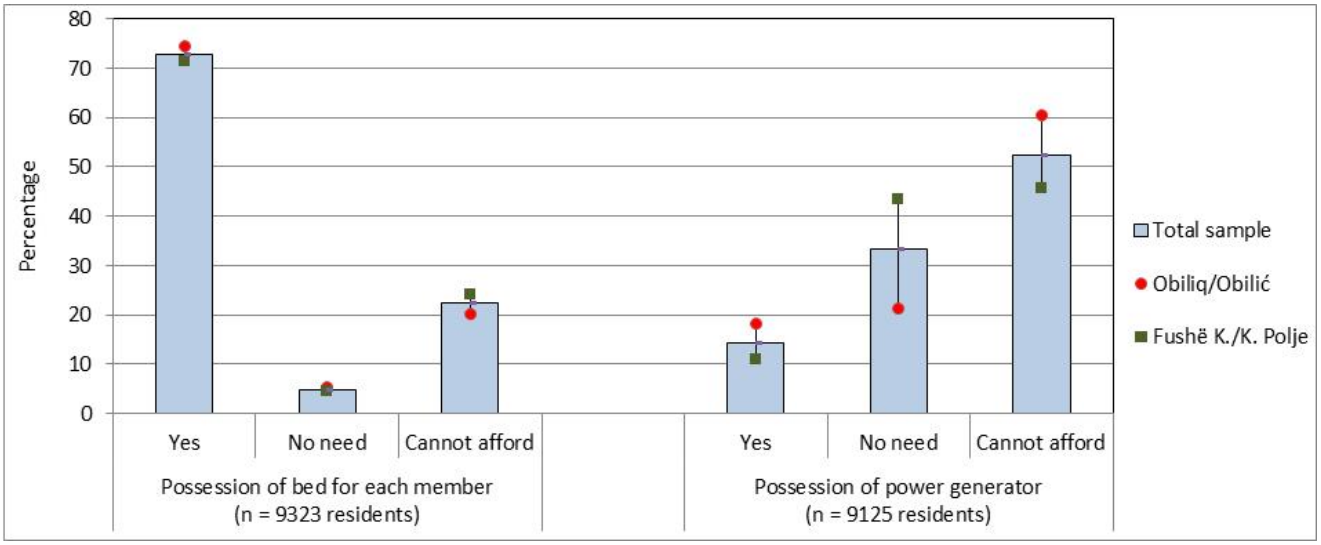
The variables of the four clusters (HS, WHS, EE, AF) were analysed using frequency distribution and bivariate analysis. The key issues identified during these analyses are presented and described below. A complete overview of the frequency distributions for all cluster variables is provided in Annex 3.

3.2.1 Housing services (HS) cluster

The HS cluster (see Table 2) indicates that housing equipment was acceptable in most households: about 97% of all households indicated that there was an energy supply to the dwelling; 90% reported having a fridge, a stove and a kitchen area; and 82% reported having a washing machine. Variations between the two municipalities were very small. The main areas of concern were that every fourth household did not provide a bed for each household member and that more than half of households reported that they were unable to afford a power generator – something that is often needed, even where there is a connection to the energy grid, to make up for failures in the public supply (see Fig. 2). The issue of power generators seems to be somewhat more significant in Obiliq/Obilić, where more households that needed a generator indicated that they could not afford one.

Table 2. HS cluster
Possession of a fridge
Possession of a stove
Possession of a washing machine
Possession of a bed for each member
Possession of a power generator
Kitchen in the dwelling
Electricity supply in the dwelling

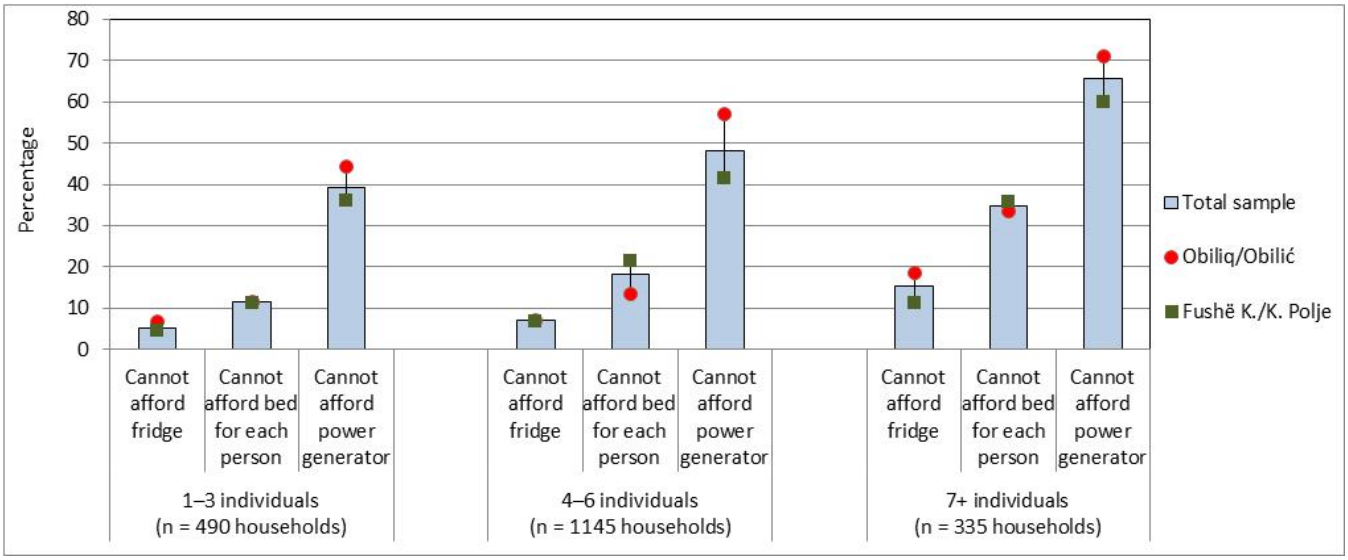
Fig. 2. Availability of an adequate number of beds and a power generator



Looking beyond simple frequencies and combining variables on housing services and location, energy supply is nearly equal in urban and rural areas. However, of the 3% of the population that do not have access to energy in their home, 90% cannot afford a power generator and are thus left without access to any energy supply. Regarding urban–rural differences, the main variations relate to having a bed for each household member (70.2% in urban areas as against 78.1% in rural areas) and having a stove in the home (95.2% in urban areas as against 86.8% in rural areas).

Looking at the effect of other variables on housing conditions, it seems that housing not owned by residents is of a slightly higher quality, as households paying rent complain less often about problems such as lack of energy, space or equipment. This might indicate that home ownership, in contrast to many other countries, is not a marker for affluence or good housing. The data also show that households with many members are strongly disadvantaged, especially with respect to housing equipment and space (see Fig. 3).

Fig. 3. Availability of a fridge, an adequate number of beds and a power generator by household size

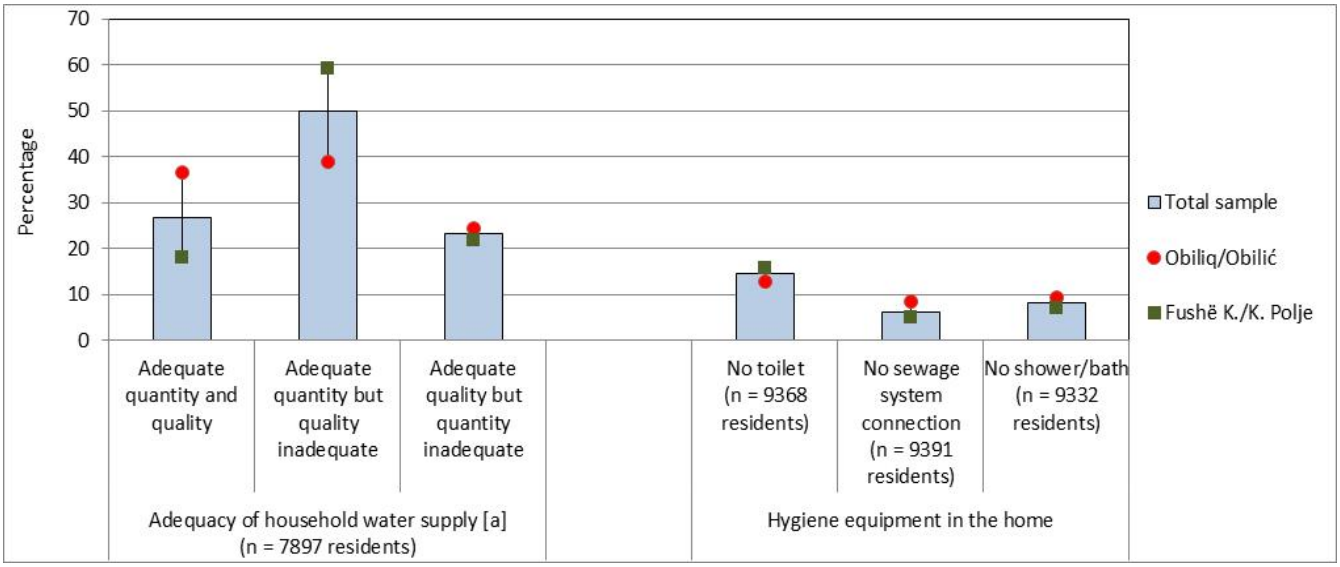


3.2.2 Water/hygiene/sanitation (WHS) cluster

Table 3. WHS cluster
Toilet in the dwelling
Bathroom in the dwelling
Sewage system connection
Shower/bath in the dwelling
Main source of water supply
Perception of quality and quantity of water as inadequate

For the WHS cluster (see Table 3), the vast majority of households report adequate sanitary conditions, with more than 90% having a bathroom, shower or bath, and a sewage system connection in their dwelling (see Fig. 4). Again, these features are largely similar in the two municipalities. The main challenges identified for the WHS cluster are the lack of a toilet in the dwelling (about 15% of households) and perceived quality and quantity issues with the supplied drinking-water; only 26.9% of all households report having no problem with quality and quantity, while 49.9% of all households (and as many as 60.2% of Fushë Kosovë/Kosovo Polje households) perceive the quality to be inadequate.[16] Some 23.2% of all households perceive the quality to be acceptable but indicate problems with the quantity of water supplied. It is not possible to say whether such problems relate to (a) insufficient volume of water, (b) low water pressure, or (c) interrupted and intermittent supply.

Fig. 4. Perception of water supply and hygiene equipment



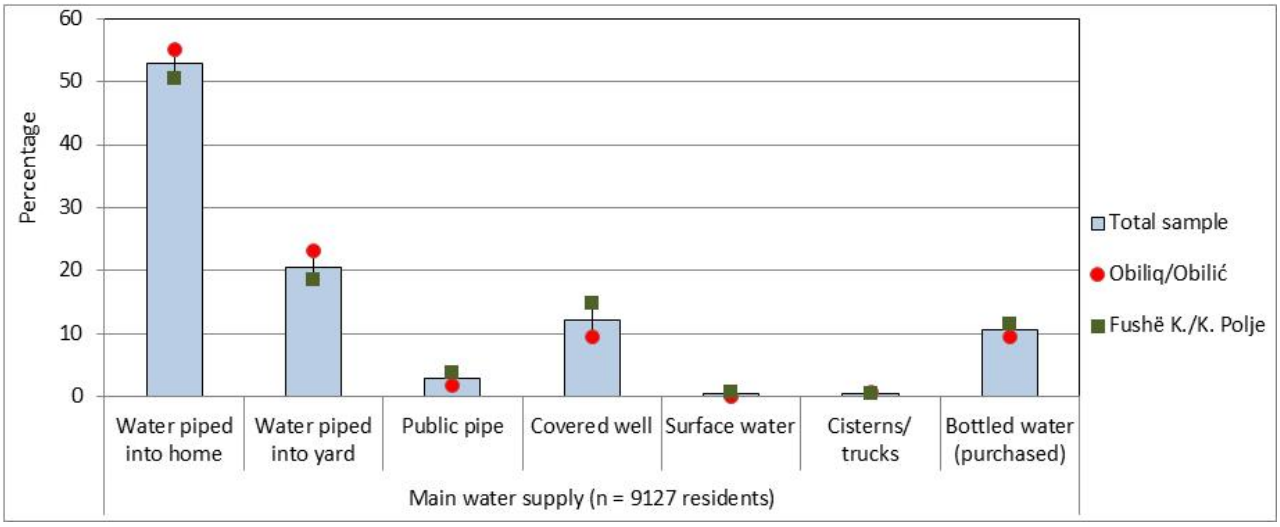
[a] The subjective perception of water quality and adequacy does not indicate safe or unsafe water in terms of health.

For 53% of all households the main water supply is tap water supplied in the dwelling; 20.6% receive tap water in the yard; 12.2% use a covered well as their main drinking-water source; and 10.5% reported using bottled water as the main source for drinking.[17] The variations between Fushë Kosovë/Kosovo Polje and Obiliq/Obilić regarding water supply are marginal (see Fig. 5).

[16] Data on water quality as reported by residents need to be treated with care, as it is difficult to form such perceptions on the basis of sight, taste and smell alone. Although such assessments may still be relevant from a health point of view, "inadequate water quality" does not necessarily mean the same as "water unsafe to drink".

[17] It is unclear whether more individuals may have used bottled water but chose to respond to the question by referring to the "standard" water supply in or around their home. The figure of 10.5% may thus be an underestimate.

Fig. 5. Sources of water supply

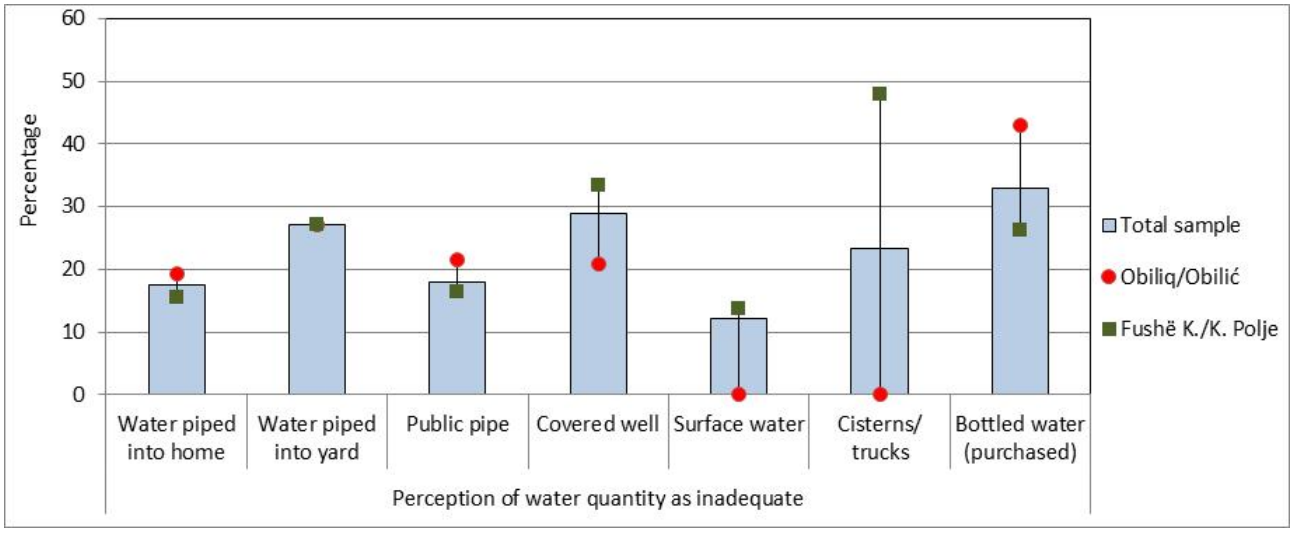


Following the JMP criteria for water supply,[18] the categories of piped water supply (piped into the home, piped into the yard, public pipe) represent the preferred drinking-water supply options (covering roughly three quarters of the population) in comparison to the other, non-piped supply sources. Over 10% of the sample are reported to use bottled water. Although the water is the same in all public networks, the quality of piped water supplied to the home and to the yard is perceived to be much better (about a third of the population supplied in this way consider it bad or very bad) than water from public pipes (61.4% of people supplied in this way consider it bad or very bad). This shows that subjective perception plays a major role in the assessment of drinking-water quality, making it difficult to interpret the results. Still, the other (non-piped) drinking-water sources are perceived to be worse, with water quality reckoned to be bad or very bad in high proportions of the respective population groups supplied in these ways (63% for water supplied through wells, 75.7% for surface water, and 87.4% for water from cisterns or trucks). Households choosing to buy bottled water also tend to be dissatisfied with the public water supply (70.6%), suggesting that bottled water may be the preferred option largely because the public supply is considered by a large part of the population to be low-quality.

Looking at satisfaction with the perceived quantity of the standard water supply shows that quantity and reliability of supply is also an issue (see Fig. 6). Quantity problems were greatest for water from covered wells and water piped to the yard. The data also indicate that a third of all households who preferred to buy bottled water reported problems over quantity with their standard water supply. Unfortunately, it is not possible to identify the standard water supply for those individuals who prefer to buy bottled water.

[18] Joint Monitoring Programme for Water Supply and Sanitation, operated by WHO/UNICEF.

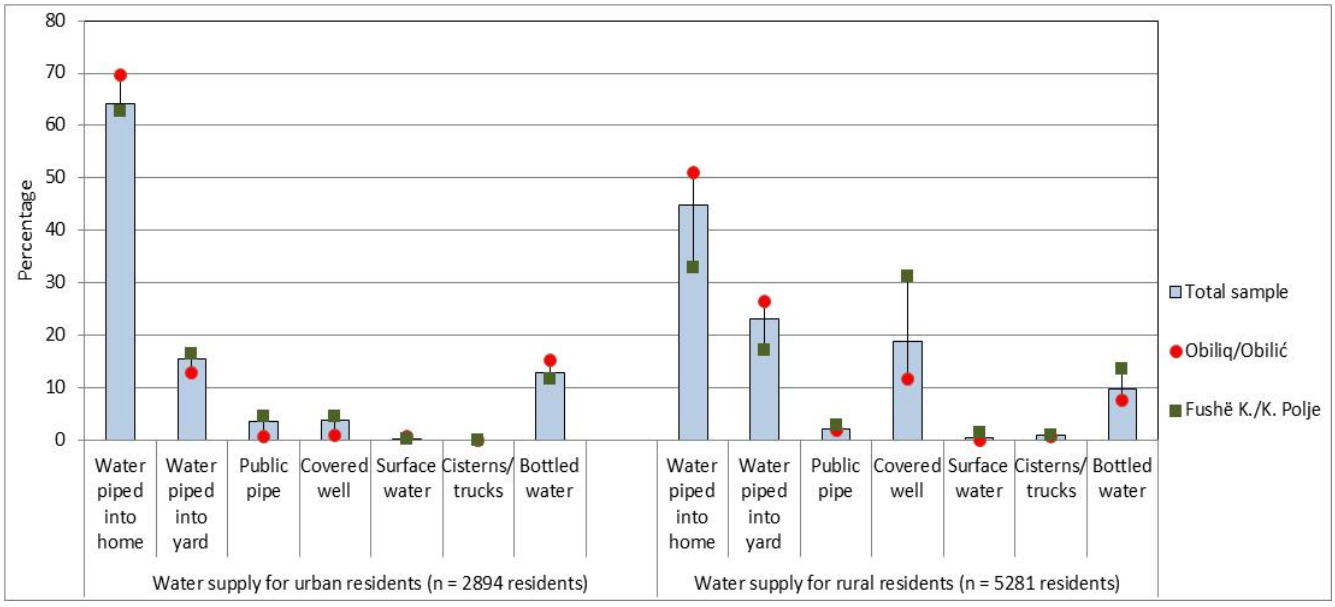
Fig. 6. Perception of quantity of water supply as inadequate



The water supply also differs in urban and rural contexts, with water piped into the dwelling being most common in urban households (64.1%) and other options most common in rural households, specifically water piped to the yard (23%) and water from covered wells (18.9%) (see Fig. 7). The main difference between the two municipalities is that in rural Fushë Kosovë/Kosovo Polje there are almost as many people supplied by covered wells (31.3%) as by water piped into the dwelling (33%).

In urban areas, a significant majority (68.4%) complain about inadequate water quality, while quantity of supply seems less problematic (11.5%). In rural areas, water quality issues are reported by fewer households (41.4%), but inadequate quantity of water supply is reported much more often (27.6%).

Fig. 7. Water supply by residence

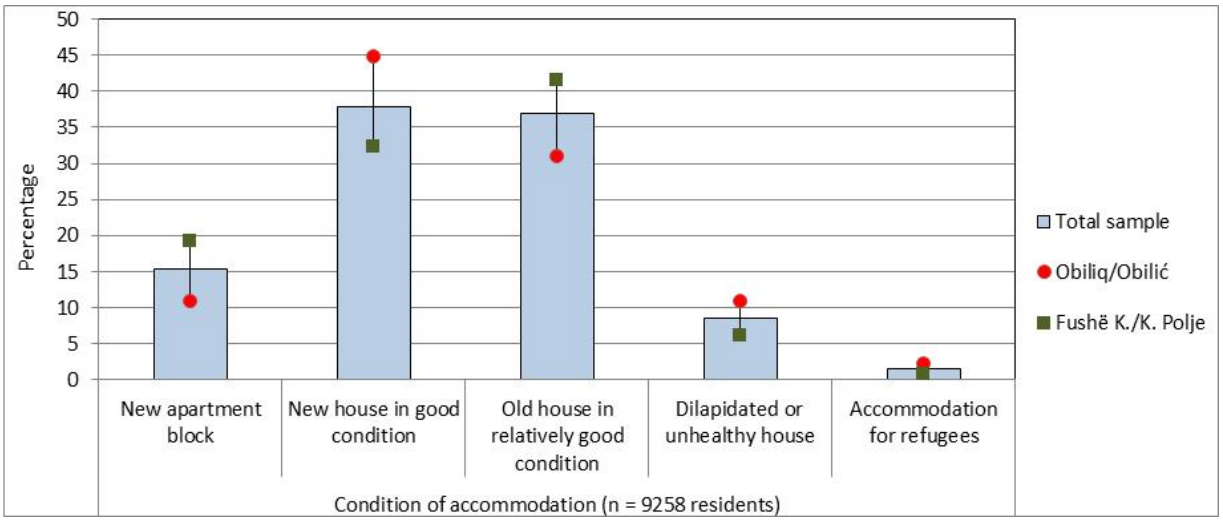


3.2.3 Environmental exposure (EE) cluster

The EE cluster (see Table 4) covers a range of environmental health threats related to location and neighbourhood conditions, harmful housing conditions and energy supply. A closer look at the housing conditions shows that the majority of the sample live in a new house considered to be in good condition (37.8%), or in an old house considered to be in relatively good condition (36.9%) (see Fig. 8). In Obiliq/Obilić, there seem to be more residents in newer houses, while in Fushë Kosovë/Kosovo Polje more residents are in older houses. Some 15.4% of the sample live in relatively new apartment blocks (more often in Fushë Kosovë/Kosovo Polje, which is more urban), while 8.5% of the population live in inadequate (dilapidated or unhealthy) homes and 1.5% reside in refugee accommodation.

Table 4. EE cluster
Condition of accommodation
Crowding (defined as individuals per room)
Energy source for cooking
Energy source for heating
Assessment of quality of air
Assessment of quality of soil
Assumed presence of toxic substances

Fig. 8. Type and condition of accommodation

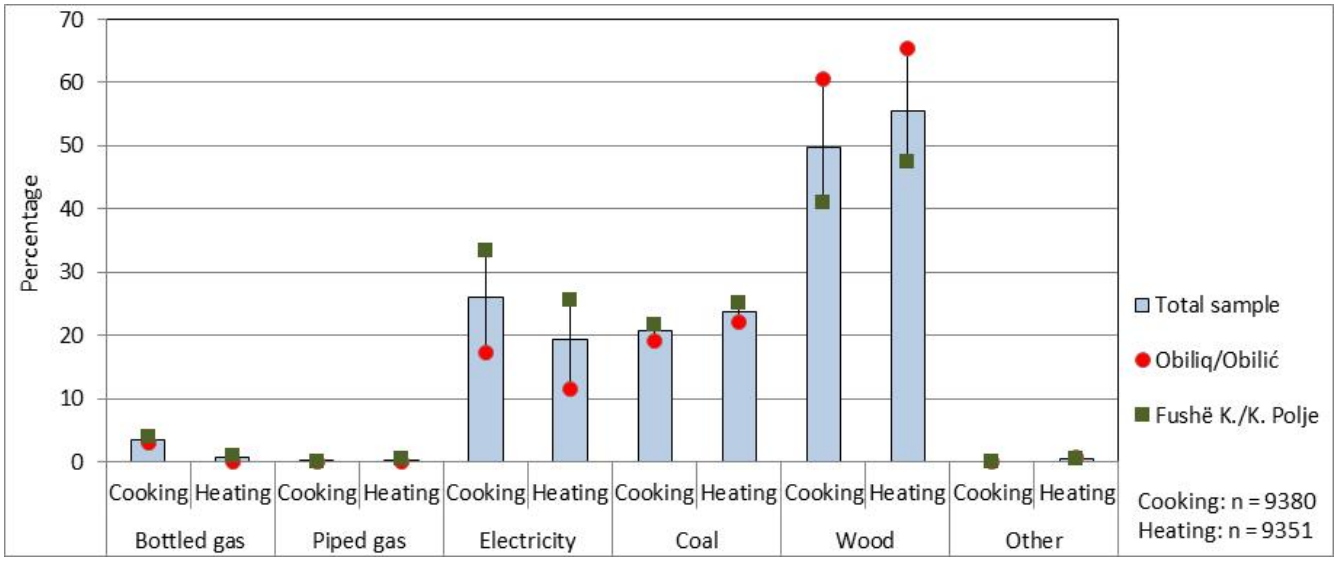


Large households with six or more members are frequent in the sample, and often such households are affected by shortage of space. Some 21.5% of the households in the sample have more than two individuals per room (counting all rooms, not only bedrooms), and another 28.7% have between 1.5 and two individuals per room.

When we come to consider use of energy and fuels, the results indicate that many individuals surveyed are at potential risk of air pollution due to solid fuel combustion (see Fig. 9). Wood is the energy source most individuals are exposed to for both cooking (49.7%) and heating (55.5%), followed by coal (20.7% and 23.8%, respectively). No information on the place and type of heating and cooking was available, so there is not enough information to estimate the number of individuals for whom solid fuel combustion for cooking and heating would lead to exposure to indoor pollution. The only clean energy source that played a significant role was electricity (26.1% for cooking, 19.3% for heating), while gas is of marginal relevance (3.5% and 0.8%, respectively). Regarding the energy supply within the municipalities, the results show that wood combustion is

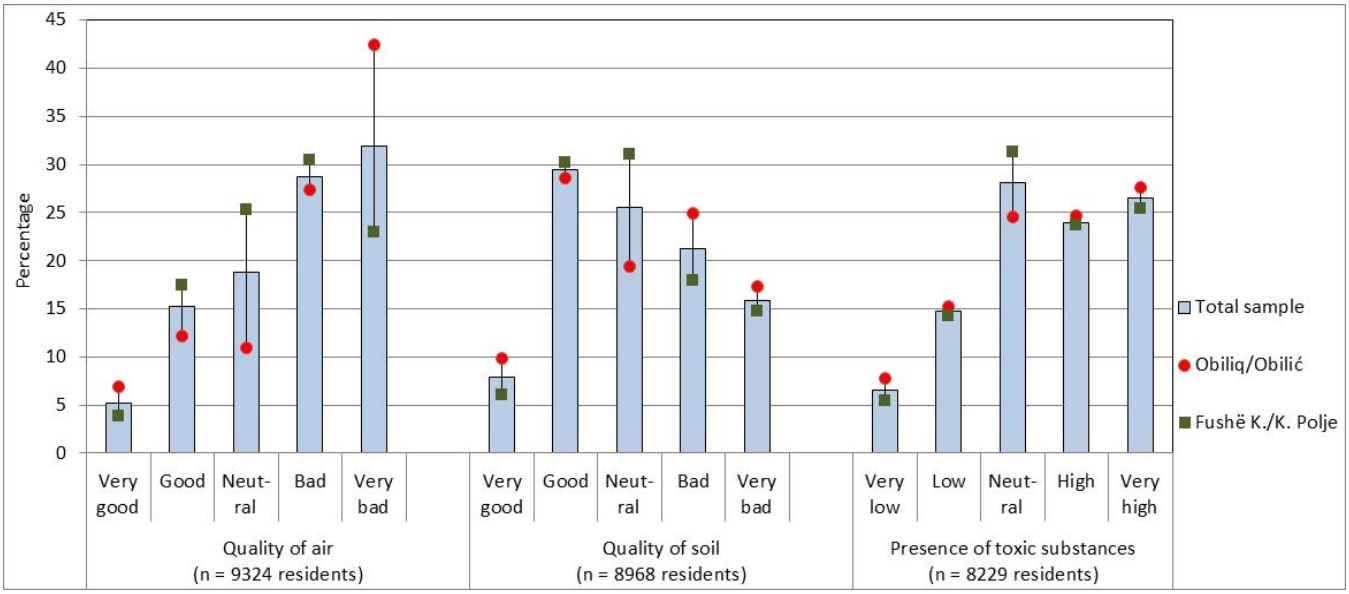
much more frequent in Obiliq/Obilić, where it mostly replaces electricity. In summary, 87.6% of all people in Obiliq/Obilić are potentially exposed to indoor air pollution from heating with coal or wood.

Fig. 9. Energy source for cooking and heating



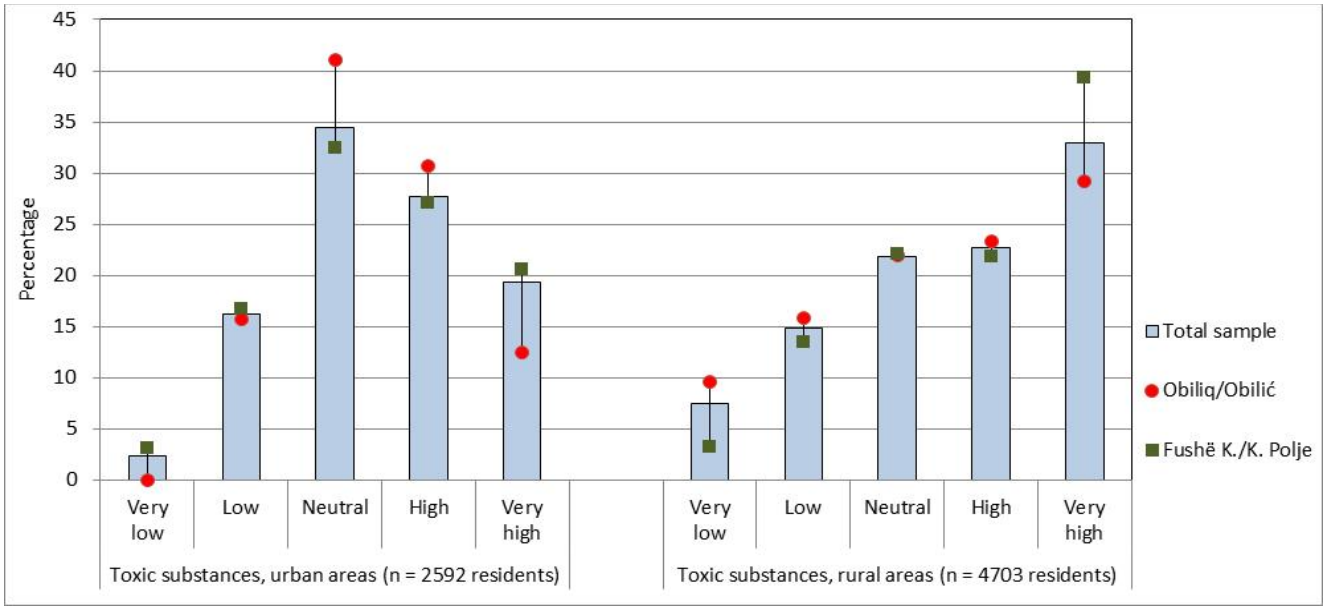
Finally, households were asked to evaluate the quality of their environmental surroundings with respect to air quality, soil quality and the presence of toxic substances (see Fig. 10). Just over 60% of all surveyed individuals reported air quality as bad or very bad (almost 70% in the case of Obiliq/Obilić). For the quality of soil, the perception was better, although more than a third considered the quality to be inadequate. Finally, 50.5% of all individuals assumed that they were exposed to toxic substances in their immediate environment.

Fig. 10. Assessment of air and soil quality and assumed presence of toxic substances



Combining some of the environmental disadvantages with other variables shows that risks are not equally distributed – they are clustered in specific areas or are associated with certain conditions. The examples given below highlight some of the clearest findings in this regard. One example is the extent to which the presence of toxic substances is perceived, which seems to be rather different between urban and rural residents (see Fig. 11). Almost a third (32.9%) of rural residents reported a very high level of exposure to toxic substances in their living area, compared to 19.3% in urban areas. This difference could be due to a higher level of contamination in rural areas, but it could also be caused by a higher awareness of environmental pollution – particularly soil pollution – in areas where families' livelihoods are based largely on agricultural activity. The perception that pollution by toxic substances is very bad is expressed more strongly in Fushë Kosovë/Kosovo Polje, in both urban and rural areas, than it is in Obiliq/Obilić.

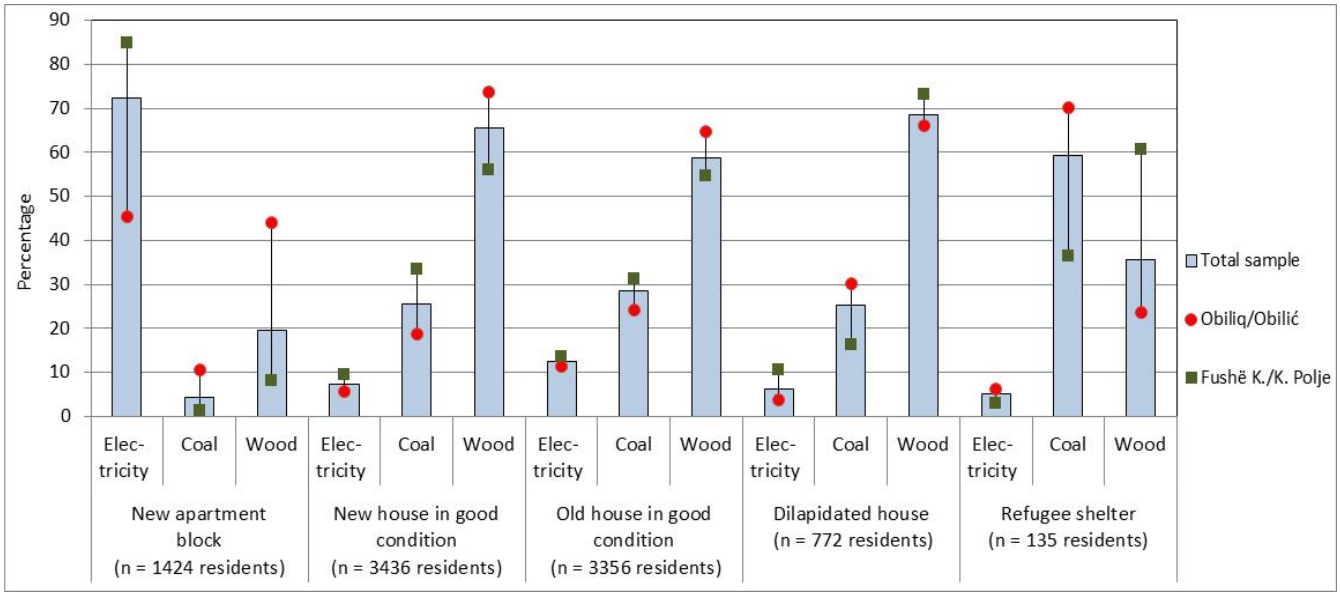
Fig. 11. Assumed presence of toxic substances by residence



A similar pattern of rural disadvantage is found in the case of air pollution, where 71.6% in rural areas reported bad or very bad air quality, compared to 45.4% in urban areas, with negligible differences between the municipalities. Electricity is the major energy source for cooking in urban areas (52.9%, followed by wood with 34.3%), while in rural areas 60.4% of the sample use wood for cooking and 24.3% coal. For heating, the dependence on solid fuels is even more prevalent in rural settings.

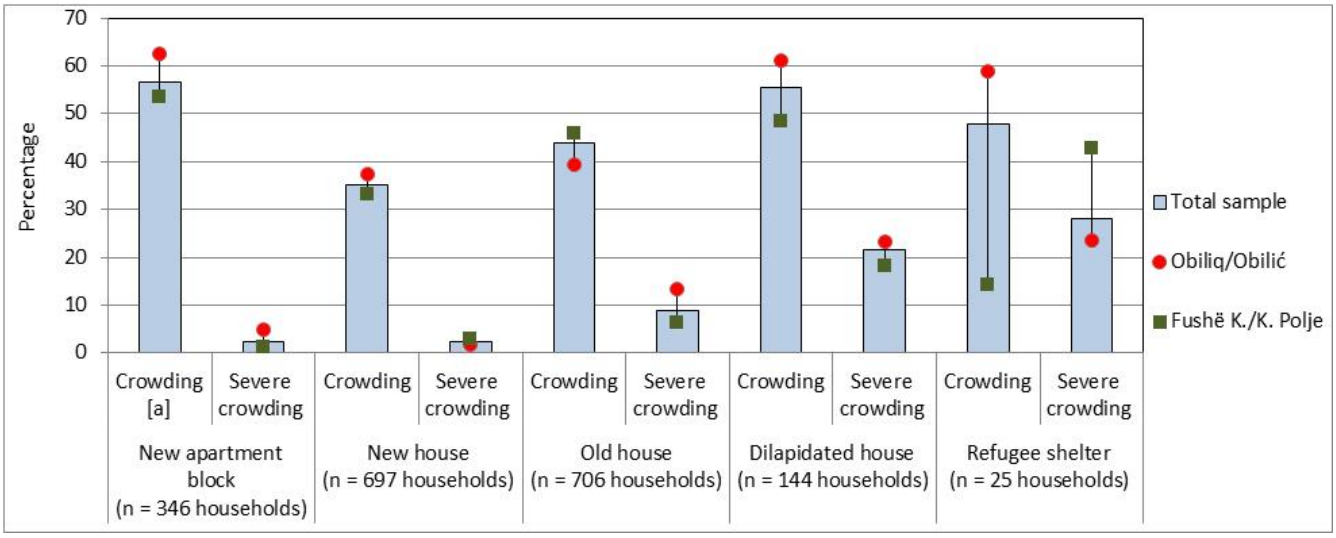
Electricity tends to be the main energy source for heating (72.4%) for new apartments (the preferred form of urban construction), while wood is the main energy source in all other housing types except refugee shelters (see Fig. 12).

Fig. 12. Energy source for heating by housing type and condition



Finally, when looking at household crowding by location and housing condition, the data reveal that crowding is not necessarily an urban phenomenon alone. Indeed, most crowding categories (1.5 to three individuals per room) are more frequent in urban households (47% versus 39.5% in rural areas), but severe crowding (over three individuals per room) is more common in rural areas (7.8%) than urban areas (4.4%). Households living in dilapidated and unhealthy housing or in refugee accommodation are especially affected by crowding: three quarters of these households live in crowded conditions, with a high proportion of them severely crowded (see Fig. 13).

Fig. 13. Crowding levels by housing type and condition



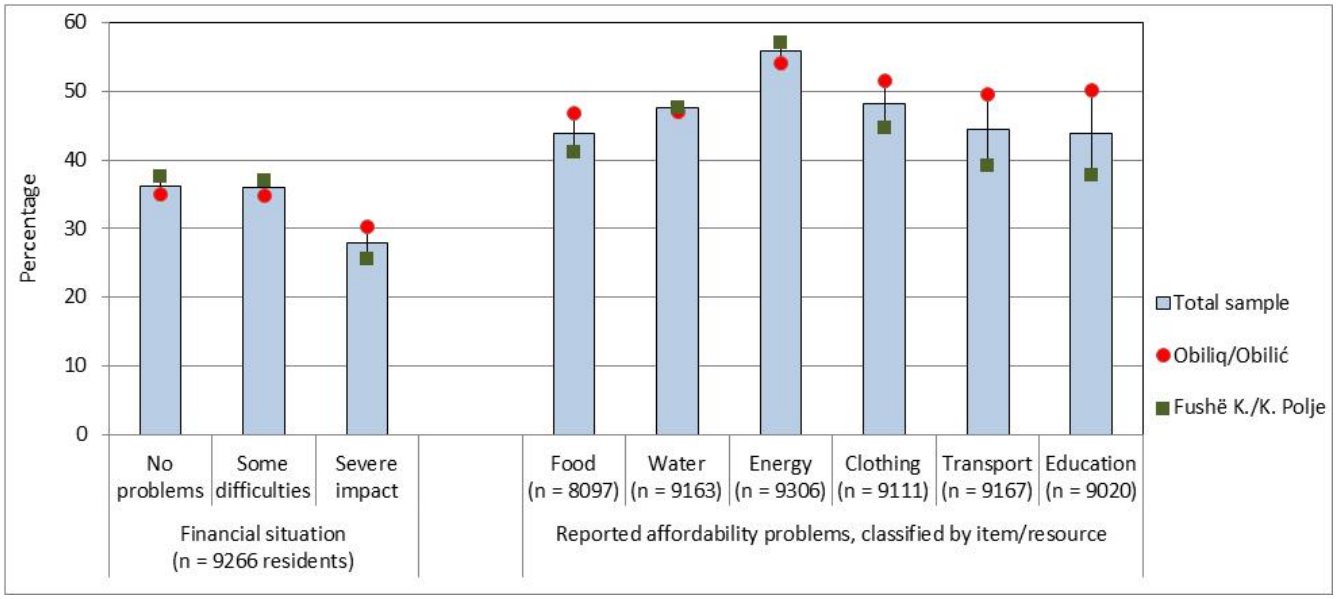
[a] "Crowding" is defined as between 1.5 and three people per room; "severe crowding" as more than three people per room.

3.2.4 Affordability (AF) cluster

Table 5. AF cluster
Financial situation of household
Problem affording food, water, energy, etc.
Household need most often sacrificed
Need to pay rent for housing
Debts for services
Family unable to afford medicine
Famine-related illness due to lack of food

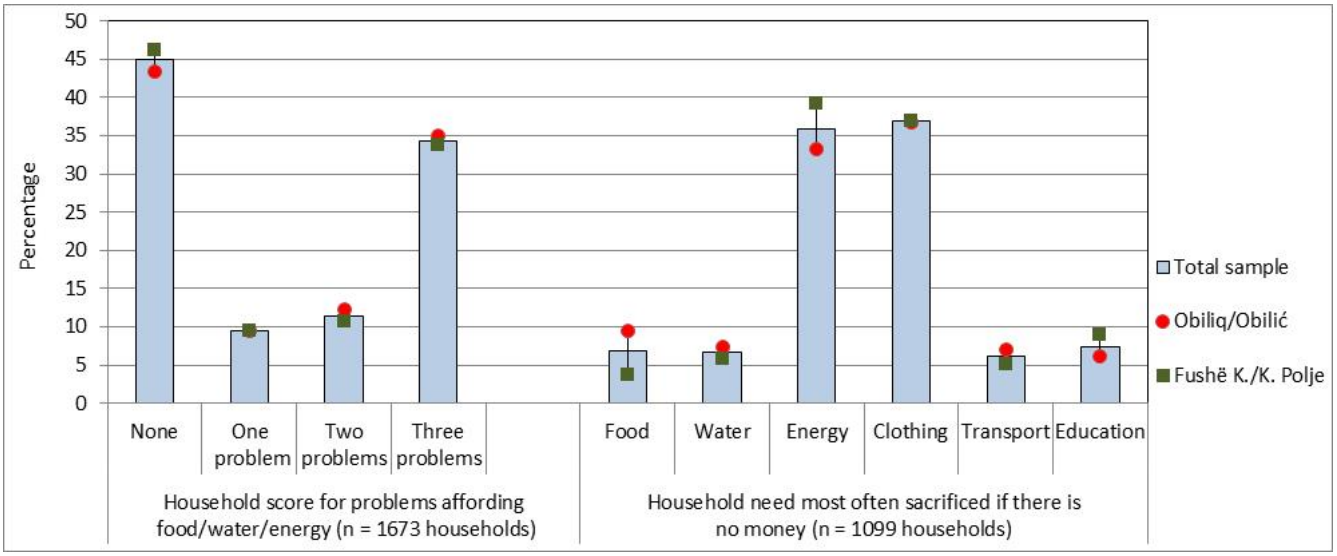
The final cluster – the AF cluster – looked at a variety of variables indicating economic vulnerability (see Table 5). It was revealed that 27.9% of the sample live in households experiencing severe impacts on daily life due to their financial situation (see Fig. 14). Energy is the item for which affordability problems are most often reported (55.9% of the sample), followed by clothing (48.2%) and water (47.6%). Affordability with respect to food is problematic for about 44% of the survey population, as it is for transport and education, indicating that financial constraints expressed through affordability problems are likely to be one of the major causes of vulnerability in the population. As only 7.6% of the households pay rent for their dwelling and there are no large debts reported for rent and mortgages, housing expenses do not seem to be a key issue of affordability. For all the relevant variables, variations in affordability between the two municipalities are rather marginal.

Fig. 14. Financial situation and affordability problems



Based on the responses to the affordability questions, an indicator of affordability problems for basic goods and services was derived by merging the responses on affordability of the three items most relevant to health: food, water and energy. This indicator of affordability problems ranges from 0 (indicating no problem affording any of the three goods/services) to 3 (indicating problems affording all three goods/services). Only 44.9% of the households surveyed have no problems affording any of the goods/services, while 34.2% of the households report facing financial restrictions for all three goods/services (see Fig. 15). This suggests that affordability problems are largely clustered and affect the same population, and that economic constraints tend to affect more than one good or service required for healthy living. If asked which household need is most often sacrificed when money is scarce, the responses show that energy (35.9%) and clothing (36.9%) are the first needs for which expenditure is reduced. Again, the variations between the two municipalities are very small.

Fig. 15. Affordability of basic goods and services and priority choices for budget cuts

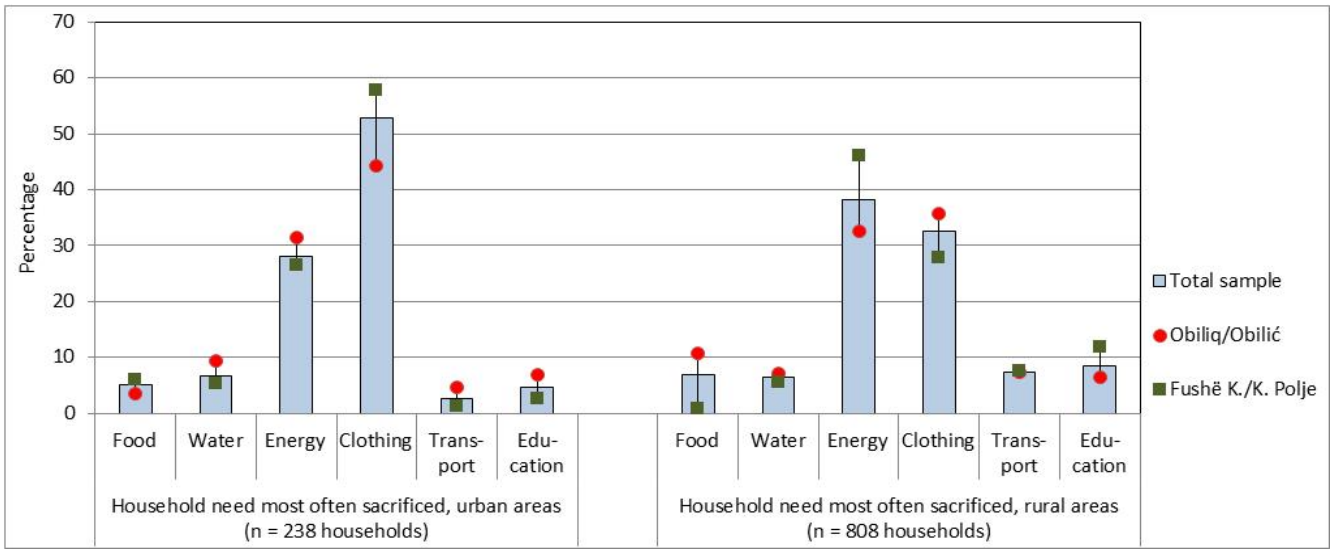


Energy and water bills are also the expenses for which most households reported large payments and debts, with 35.2% of all households having debts for electricity payments and 26.3% having debts for water supply.

Although food is one of the household needs not immediately sacrificed in response to financial restrictions, it seems that food affordability still has a significant impact on health: 18.4% of all surveyed households reported that a family member had fallen ill during the last month due to food shortage. More closely related to health expenses, 42.2% of all households reported that they had been unable to afford required medicine at least once in the last year. For all these affordability variables, the variation between the municipalities is small.

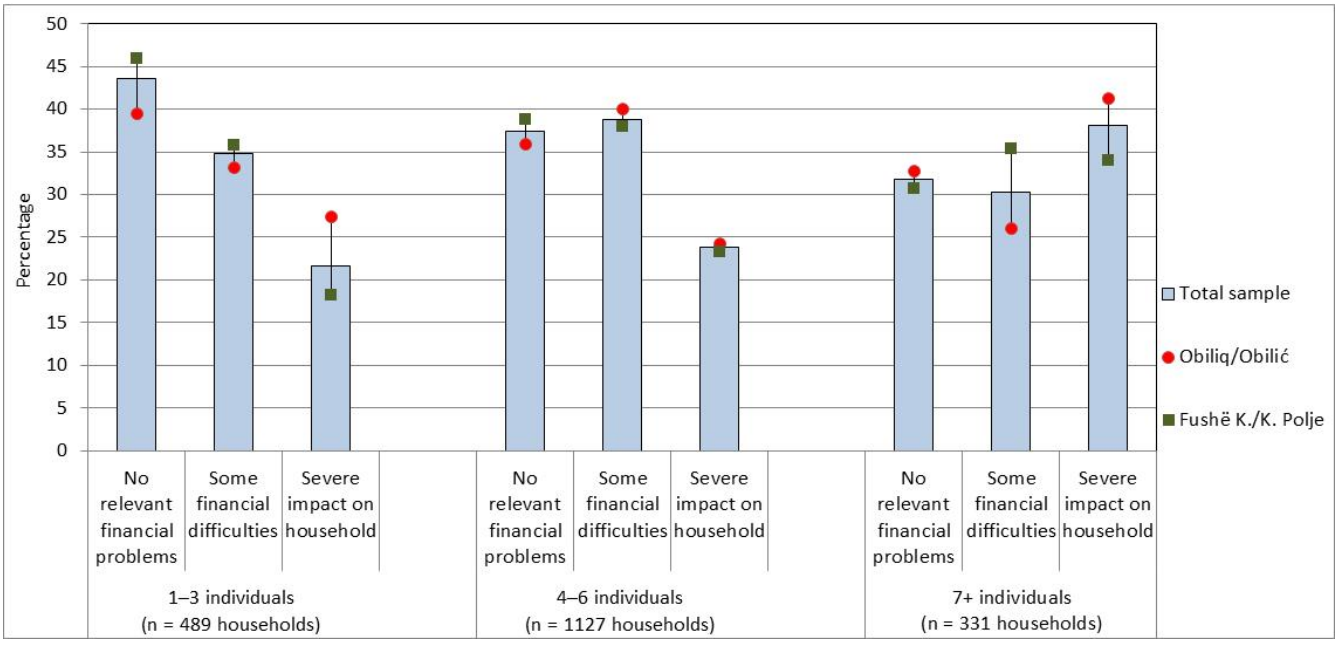
Combining affordability with other variables shows that economic vulnerability in relation to affordability and purchasing power is distributed unequally within the sample population. In urban areas, roughly half of all households are split between the highest and lowest income quintiles, indicating that urban poverty is an issue, while in rural areas the income distribution is more similar to a normal distribution, with most households (28%) lying in the middle income quintile and the highest and lowest income quintiles being underrepresented. However, in practical terms urban and rural households show only modest variations with respect to affordability of basic services. When we consider the household need that is most often sacrificed in the event of financial problems, there is some difference between urban and rural areas, as clothing is the item urban households usually make savings on, while in rural households energy is the first need for which expenditure is cut (see Fig. 16).

Fig. 16. Priority choices for budget cuts by residence



Regarding household size, in terms of both the number of household members and the crowding indicator (the number of individuals per room), the results indicate that large households are much more likely to suffer economic vulnerability (see Fig. 17) and report more affordability problems with respect to food and basic services such as energy and water.

Fig. 17. Financial situation of households by household size



Households that cannot afford adequate housing for the relevant number of individuals and therefore suffer from crowding tend to be especially affected (for instance, more than 60% of all households with more than three individuals per room simultaneously report problems affording food, energy and water, and more than 70% are in severe financial difficulties). In addition, larger households more often face problems paying for medical expenses, and report a higher prevalence of diseases associated with food shortage as a consequence

of financial constraints. Finally, the data suggest that households with children are also at higher risk of economic vulnerability.

3.2.5 Priorities of environmental vulnerability

The overview of environmental conditions and their distribution presented above shows great differences between urban and rural areas as well as between the two municipalities. It also shows that, in general, some problems are widespread within the sampled population while others affect only a very small proportion of the survey sample. Looking at the environmental issues that affect substantial parts of the population, the key priorities relate to:

- inadequate quality (49.9%) and quantity (23.3%) of drinking-water supply to the households;
- unaffordability of basic services such as adequate water (47.6%) and energy (55.9%);
- use of solid fuels (wood and coal) as the main energy source for heating (79.3%) and cooking (70.4%);
- perceived air pollution (60.7%) and reported environmental contamination with toxic substances (50.5%) in the neighbourhood area.

On the other hand, there are a range of issues for which the percentage of households affected is fairly low (for example, lack of energy supply to the dwelling: 3.2%; no sewage system connection: 6.1%), indicating that – despite the need for further improvement – these issues may not be a high priority. Nevertheless, environmental disadvantages that are not very prevalent in the total sample may still show strongly increased levels within specific population groups (for example, while 12% of the total sample receive their water from covered wells, which are not considered a safe water source, in rural areas of Fushë Kosovë/Kosovo Polje almost a third of all people (31.3%) have their water supplied by covered wells).

3.3 Analysis step 3: most vulnerable population subgroups

Having identified the main problems encountered by the sample population in the study area, the next step was to focus on the assessment of inequalities in environmental disadvantage within the population. The main objective of this analysis was to determine whether there is a statistically significant difference in environmental exposure between specific population groups that is associated with demographic, socio-economic, ethnic or location-related factors. For this analysis chi-square tests were used.

Below, the results for the four clusters are displayed, showing the most relevant inequalities in exposure for the different variables. The summary tables provide information on:

- the percentage of the total sample suffering the given environmental disadvantage;
- the percentage of the most advantaged and disadvantaged population subgroups suffering the given environmental disadvantage;
- the population subgroup that is most disadvantaged.

The relative difference between the most advantaged and disadvantaged groups is quantified by the inequality ratio, which refers to the relative difference of exposure between the most advantaged and disadvantaged population groups. An inequality ratio of 2.0 indicates twice as high an exposure to a certain environmental disadvantage, while an inequality ratio of 5.0 indicates that the exposure is five times higher.

The summary tables present the most marked inequalities, but they do not include all those that are statistically significant because of the large number of results produced. A certain variable or determinant that is not listed in the summary tables does not imply that its distribution was not associated with a statistically significant inequality.

3.3.1 HS cluster

Socioeconomic, demographic, spatial and ethnic exposure differences

For the analysis of vulnerabilities related to housing services, the variables (describing housing-specific conditions) and determinants (describing population subgroups with different exposure levels) that were used are shown in Table 6.

Table 6. Variables used in analyses of inequalities associated with housing services

Environmental variables	Determinants	
Housing services	**Demographic**	**Socioeconomic**
Lack of a fridge	Sex	Education
Lack of a stove	Age	Income quintiles
Lack of a bed for each person	Household with children	Employment
Lack of electricity supply in dwelling	Household size	Financial situation
	Additional determinants	
	Ethnicity	Municipality
		Urban versus rural

Major inequalities were identified for all housing variables, with disadvantaged groups being much more frequently exposed to housing-related problems (see Table 7). In the case of not having a fridge, the strongest inequalities are found for different ethnic groups, where 9.3% of the total sample are affected; prevalence levels range from 0.1% to 28.3%, the latter figure relating to RAE, the most disadvantaged ethnic group with respect to lacking a fridge. This very marked variation results in an inequality ratio of over 200. The results also indicate that, for each housing disadvantage, the inequalities are triggered by a variety of determinants.

Table 7. Inequalities associated with housing service variables

Variable	% of total sample	Most advantaged group (%)	Most disadvantaged group (%)	Inequality ratio	Significance level	Most disadvantaged group
Lack of a fridge, stratified by …						
Ethnicity	9.3	0.1	28.3	283.0	<0.001	RAE
Income quintiles	8.7	0.1	24.2	242.0	<0.001	Lowest quintile
Education	8.2	0.3	27.6	92.0	<0.001	No education
Employment	7.1	0.6	11.8	19.7	<0.001	Unemployed
Financial situation	9.4	2.0	26.5	13.3	<0.001	Severe impact
Age	9.5	2.8	15.6	5.6	<0.001	Children (0–14)
Household with children	9.6	2.6	11.5	4.4	<0.001	Yes
Household size	9.6	5.3	16.1	3.0	<0.001	7+ individuals
Lack of a stove, stratified by …						
Ethnicity	8.9	0.1	26.3	263.0	<0.001	RAE
Education	8.1	0.1	24.3	243.0	<0.001	No education
Income quintiles	8.8	0.5	21.3	42.6	<0.001	Lowest quintile
Financial situation	8.9	1.4	25.2	18.0	<0.001	Severe impact
Employment	7.3	1.1	11.6	10.5	<0.001	Unemployed
Age	8.9	2.8	14.5	5.2	<0.001	Children (0–14)
Household size	9.1	4.0	16.7	4.2	<0.001	7+ individuals
Household with children	9.1	2.8	10.8	3.9	<0.001	Yes
Municipality	8.7	4.7	13.5	2.9	<0.001	Obiliq/Obilić
Residential location	9.5	4.3	11.4	2.7	<0.001	Rural
Lack of a bed for each person, stratified by …						
Education	19.8	1.6	53	33.1	<0.001	No education
Income quintiles	19.8	2.1	53.5	25.5	<0.001	Lowest quintile
Ethnicity	22.2	3.6	63	17.5	<0.001	RAE
Financial situation	22.1	3.7	54.2	14.6	<0.001	Severe impact
Employment	16.1	3.3	25.1	7.6	<0.001	Unemployed
Age	22.4	9.8	33.8	3.4	<0.001	Children (0–14)
Household with children	22.5	8.2	26.7	3.3	<0.001	Yes
Household size	22.5	11.8	35.8	3.0	<0.001	7+ individuals
Lack of electricity supply in dwelling, stratified by …						
Education	2.6	0.1	10.0	100.0	<0.001	No education
Ethnicity	3.1	0.2	9.3	46.5	<0.001	RAE
Financial situation	3.0	0.4	8.0	20.0	<0.001	Severe impact
Income quintiles	2.2	0.5	6.6	13.2	<0.001	Lowest quintile
Employment	2.2	0.3	3.6	12.0	<0.001	Unemployed
Age	3.0	0.8	4.7	5.9	<0.001	Children (0–14)
Household size	3.0	2.1	4.8	2.3	<0.001	7+ individuals

The impact of individual socioeconomic, demographic, spatial and ethnic determinants is highly variable, with the strongest inequality ratios triggered either by ethnicity or by education. Income, employment and financial situation are also powerful socioeconomic factors. This suggests that inequalities in housing services are strongly influenced by socioeconomic determinants (which are probably associated with purchasing power in the housing market), while demographic and spatial determinants are much less influential. However, the dominance of socioeconomic inequalities in housing service conditions should not obscure the fact that age, household size and the presence of children are associated with substantial inequality ratios between 3 and 5.

The highest inequality ratios (over 200) are found for the population lacking a fridge or a stove; these high ratios are explained by the very low incidence of the respective housing problem in the advantaged population group (0.1%). In general, the inequality ratios found for socioeconomic determinants and ethnicity tend to be very high, indicating that socioeconomic status is strongly associated with the quality of housing services.

Inequalities related to residential location in urban versus rural areas or to municipality were identified only for "lack of a stove", which is the housing variable most affected by demographic factors. For other housing variables, residential location and municipality showed relatively low variations, although some of these were still statistically significant.

As a final task, an HS score was produced on the basis of four potential housing problems:

- lack of a fridge
- lack of a stove
- lack of a bed for each person
- lack of electricity supply in the dwelling.

The variables were not weighted, therefore the scores ranged from 0 (no housing problems at all) to 4 (all four housing problems). The HS score suggested that 75.7% of the sample had good housing conditions (no problems at all). Moderate housing conditions (one housing problem, most often not having a bed for each household member) were reported by 12.7% of the population, and inadequate conditions (two housing problems or more) by 11.6%.

The five strongest determinants of inequalities related to inadequate housing conditions are shown in Table 8.

Table 8. Inequalities associated with inadequate housing

Variable	% of total sample	Most advantaged group (%)	Most disadvantaged group (%)	Inequality ratio	Significance level	Most disadvantaged group
Inadequate housing conditions [a], stratified by …						
Ethnicity	11.3	0.1	35.1	351.0	<0.001	RAE
Education	10.1	0.1	34.2	342.0	<0.001	No education
Income quintiles	10.8	0.5	29.4	58.8	<0.001	Lowest quintile
Employment	9.1	0.8	15.0	18.8	<0.001	Unemployed
Financial situation	11.5	1.8	32.7	18.2	<0.001	Severe impact

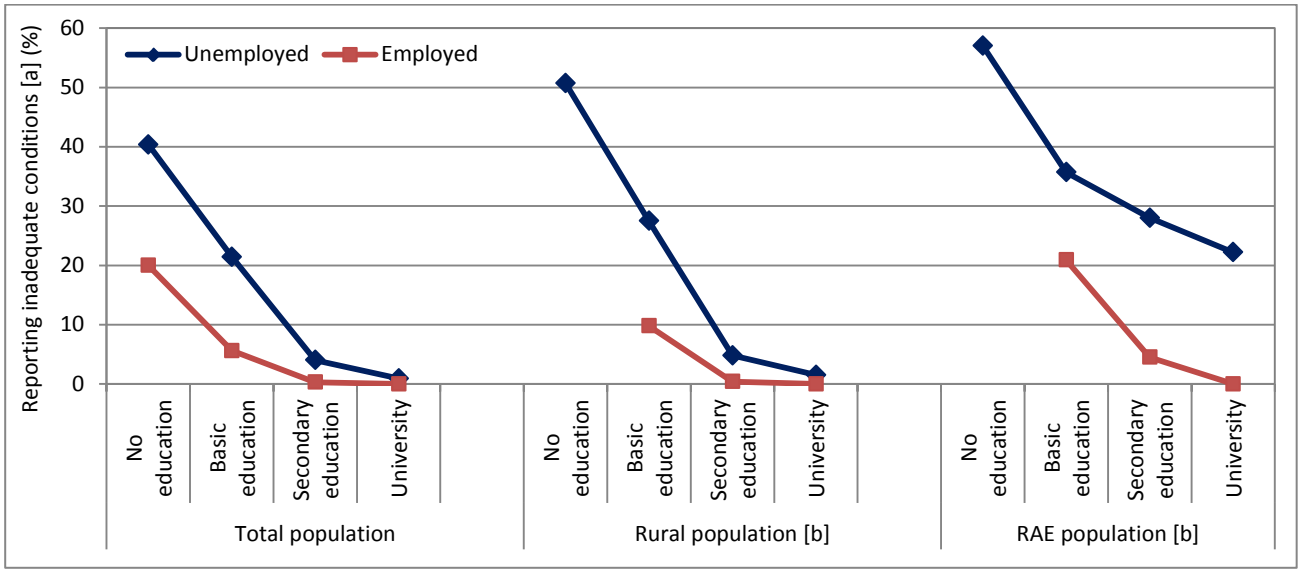
[a] HS score indicating two or more problems.

Although there is a clear dominance of ethnicity and socioeconomic determinants, it should be acknowledged that the demographic variables also play a significant role in housing inequalities, with inequality ratios of 5.1 (age) and 4.9 (household with children).

Impact of employment on inadequate housing conditions

To explore the effect of employment (a single determinant which can be affected by policy actions), analysis was carried out on the frequency of inadequate housing conditions in the case of employed and unemployed individuals within each educational category. The results are shown in Fig. 18 and suggest that, especially within the lower educational categories, employment has a very positive effect on the risk of housing problems: for all individuals without education, the frequency drops from 40.4% to 20%, and for individuals with basic education from 21.4% to 5.6%. The same positive effect of being employed is found for specific population subgroups (rural population and RAE), for which the housing-related disadvantage is even higher. This suggests that employment campaigns for individuals who have a low level of education might be a highly effective approach to reducing housing-related vulnerability within the population.

Fig. 18. Effect of employment on inadequate housing conditions



[a] HS score indicating two or more problems.

[b] For both rural and RAE populations, there was an insufficient number of employed individuals without education (n = 1 or 2). The percentages are therefore not reliable and are not shown.

Conclusion

Concluding the analysis of vulnerability to inadequate housing, the most disadvantaged population subgroups tend to be RAE and individuals affected by socioeconomic constraints such as low income, unemployment and lack of education. Inequality ratios can be extreme (over 100) for these determinants; this is caused by the very low prevalence of housing disadvantages in Albanian residents and in population groups with high socio-economic status. Demographic determinants (age, household size, etc.) and spatial determinants (urban–rural residence, municipality) contribute less to these inequalities, but still show significant associations.

3.3.2 WHS cluster

Socioeconomic, demographic, spatial and ethnic exposure differences

For the analysis of inequalities related to water/hygiene/sanitation, the variables (describing water, sanitary and hygiene conditions) and determinants (describing population subgroups with different exposure levels) that were used are shown in Table 9.

Table 9. Variables covered by analyses of inequalities associated with water/hygiene/sanitation

Environmental variables	**Determinants**	
Water/hygiene/sanitation	**Demographic**	**Socioeconomic**
Lack of a shower or bath in the dwelling	Sex	Education
Lack of a toilet in the dwelling	Age	Income quintiles
Lack of a bathroom in the dwelling	Household with children	Employment
Lack of a sewage system connection	Household size	Financial situation
Non-piped water source	**Additional determinants**	
Perception of water supply quality/quantity as inadequate [a]	Ethnicity	Municipality Urban versus rural

[a] Perception of water supply as inadequate does not necessarily indicate that water is unsafe from a health perspective.

Serious inequalities were identified for multiple variables and were associated with a variety of determinants. Education, income and ethnicity have the strongest impact, while employment, age and household size are less influential and have an impact only on particular inequalities. Residential location and municipality appear to be associated with one inequality variable only.

For the variable “Perception of water supply quality/quantity as inadequate”, the inequality ratios are much lower than for all other exposure variables in the area of water/hygiene/sanitation (see Table 10). This is due to the fact that the water supply issue affects a large part of the population and extends also to more affluent groups with higher socioeconomic status. The result of the higher prevalence level of the water issue is that absolute exposure differences of 10 to 15% do not translate into high relative differences. Despite the smaller inequality ratios, water-related issues are identified as one of the main spatial equity challenges, as perception of water quality and quantity shows significant municipal inequalities and access to non-piped water sources is associated with urban–rural residence inequalities. However, it must be noted that the perception of water quality is not an entirely reliable assessment, compared to the perception of water quantity, which is less subjective.

Table 10. Inequalities associated with water/hygiene/sanitation variables

Variable	% of total sample	Most advantaged group (%)	Most disadvantaged group (%)	Inequality ratio	Significance level	Most disadvantaged group
Lack of a shower or bath in the dwelling, stratified by …						
Education	7.2	0.1	25.2	252.0	<0.001	No education
Income quintiles	7.1	0.4	21.4	53.5	<0.001	Lowest quintile
Ethnicity	7.9	0.6	23.5	39.2	<0.001	RAE
Employment	6.4	0.8	10.5	13.1	<0.001	Unemployed
Financial situation	8.4	1.7	21.5	12.6	<0.001	Severe impact
Age	8.1	2.6	12.5	4.8	<0.001	Children (0–14)
Household size	8.3	5.9	13.9	2.4	<0.001	7+ individuals
Lack of a toilet in the dwelling, stratified by …						
Ethnicity	14.5	3.9	24.2	6.2	<0.001	RAE
Education	14.2	9.5	30.3	3.2	<0.001	No education
Income quintiles	14.3	8.6	26.0	3.0	<0.001	Lowest quintile
Financial situation	14.8	8.8	23.3	2.6	<0.001	Severe impact
Age	14.5	9.0	17.7	2.0	<0.001	Children (0–14)
Lack of a bathroom in the dwelling, stratified by …						
Ethnicity	8.0	0.3	20.2	67.3	<0.001	RAE
Education	6.9	1.0	20.3	20.3	<0.001	No education
Income quintiles	7.3	1.6	16.8	10.5	<0.001	Lowest quintile
Financial situation	7.9	2.7	17.9	6.6	<0.001	Severe impact
Employment	6.8	1.9	10.2	5.4	<0.001	Unemployed
Lack of a sewage system connection, stratified by …						
Ethnicity	6.4	0.7	17.6	25.1	<0.001	RAE
Education	5.6	0.9	17.0	18.9	<0.001	No education
Income quintiles	6.3	0.8	15.1	18.9	<0.001	Lowest quintile
Employment	5.1	0.8	8.1	10.1	<0.001	Unemployed
Financial situation	6.7	1.9	16.6	8.7	<0.001	Severe impact
Age	6.5	2.4	9.7	4.0	<0.001	Children (0–14)
Perception of water supply quality/quantity as inadequate, stratified by …						
Municipality	73.0	63.4	82.0	1.3	<0.001	Fushë K./K. Polje
Income quintiles	70.3	62.3	80.4	1.3	<0.001	Lowest quintile
Ethnicity	72.7	67.8	83.7	1.2	<0.001	RAE
Financial situation	72.8	67.0	79.2	1.2	<0.001	Severe impact
Non-piped water source, stratified by …						
Ethnicity	13.1	2.2	20.7	9.4	<0.001	Serbian
Residence location	13.6	4.1	20.1	4.9	<0.001	Rural
Financial situation	13.1	8.7	17.7	2.0	<0.001	No problems

The variable “source of water supply” was analysed for inequalities as well, but it is difficult to assess what water supply option is actually the most desirable from a health perspective, as this depends on the quality of water supply management rather than the delivery mechanism. Regarding “piped” versus “non-piped” water sources (excluding bottled water), Table 10 indicates that inequalities exist but sometimes present a reversed pattern of disadvantage, as Serbian households report that they have some form of non-piped water supply more often (20.7%) than RAE households (2.2%). For the variable “financial situation”, there is a reversed trend

as well, as households that report no financial constraints are more frequently supplied by non-piped water sources. This is largely a consequence of rural areas, where financial problems tend to be less significant and non-piped water supply is more common. However, quality of water supply and water source category do not indicate whether the supplied water is safe for consumption or not.

The results indicate that disadvantaged groups (irrespective of the determinant and irrespective of their standard water supply) are much less likely to replace the drinking-water supplied to their home with bottled water purchased in a shop. Whether this is largely a consequence of affordability problems or is also explained by differences in risk perception is impossible to say.

Finally, a WHS score was produced on the basis of six potential water/hygiene/sanitation problems:

- lack of a toilet in the dwelling
- lack of a bath or shower in the dwelling
- lack of a sewage system connection
- other water source (non-piped)
- perception of quality of water supply as inadequate
- perception of quantity of water supply as inadequate.

The variables were not weighted, therefore the scores ranged from 0 (no problems at all) to 6 (all six problems). The WHS score suggested that 67.3% of the sample have fairly good water/hygiene/sanitation conditions (no problem, or just one problem, which was usually related to water supply issues rather than to hygiene amenities). Moderate water/hygiene/sanitation conditions (two problems) were reported by 25.2% of the population, and inadequate conditions (three problems or more, indicating problems with both water supply and hygiene amenities) by 7.4%. It is important to note that the WHS score does not directly indicate harmful or unsafe water or hygiene conditions: perception of water quality is a highly subjective variable that may not be a good indicator of objective water quality; non-piped drinking-water may be very acceptable in qualitative terms; and lack of sanitary equipment may not in itself indicate a health risk.

The five strongest determinants of inequalities related to water/hygiene/sanitation are shown in Table 11.

Table 11. Inequalities associated with inadequate water/hygiene/sanitation

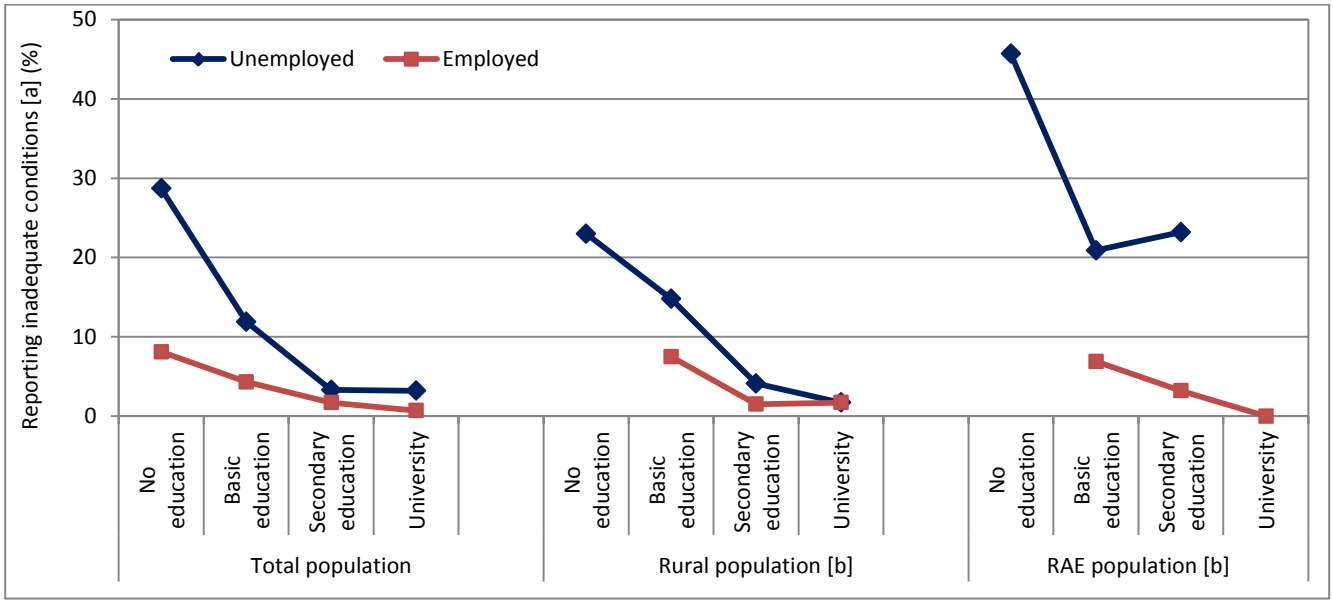
Variable	% of total sample	Most advantaged group (%)	Most disadvantaged group (%)	Inequality ratio	Significance level	Most disadvantaged group
Inadequate water/hygiene/sanitation conditions [a], stratified by …						
Income quintiles	6.5	1.3	18.5	14.2	<0.001	Lowest quintile
Ethnicity	7.1	1.7	20.7	12.2	<0.001	RAE
Education	6.5	2.1	19.9	9.5	<0.001	No education
Financial situation	7.5	3.2	18.7	5.8	<0.001	Severe impact
Employment	6.0	1.7	9.1	5.4	<0.001	Unemployed

[a] WHS score indicating three or more problems.

Impact of employment on inadequate water/hygiene/sanitation

To explore the effect of employment (a single determinant which can be affected by policy actions), analysis was carried out on the frequency of inadequate water/hygiene/sanitation conditions in the case of employed and unemployed individuals within each educational category. The results are shown in Fig. 19 and suggest that employment strongly reduces the reported prevalence of water/hygiene/sanitation problems: for all individuals without education, the frequency drops from 28.7% to 8.1%, and for all individuals with basic education from 11.9% to 4.3%. The same positive effect of being employed is found, despite data restrictions due to sample size, for rural populations and for RAE, where the disadvantage is even higher. The patterns consistently show a large benefit from employment, especially for individuals with low education, and suggest that employment campaigns for individuals who have a low level of education could be an effective approach to reducing vulnerability to inadequate water/hygiene/sanitation conditions.

Fig. 19. Effect of employment on inadequate water/hygiene/sanitation conditions



[a] WHS score indicating three or more problems.

[b] For both rural and RAE populations, there was an insufficient number of employed individuals without education (n = 1 or 2). For RAE, there were also only two unemployed individuals with university education. The percentages are therefore not reliable and are not shown.

Conclusion

The most disadvantaged population subgroups in terms of water/hygiene/sanitation tend to be RAE and residents with socioeconomic constraints such as low income, unemployment and lack of education. The magnitude of inequality ratios is highly dependent on the selected water/hygiene/sanitation variable, but compared to housing inequalities, they tend to be less extreme because there is also some water/hygiene/sanitation disadvantage in the advantaged population groups. Compared to ethnicity and socioeconomic determinants, demographic and spatial variables have a rather low relevance in the case of water/hygiene/sanitation inequalities.

When it comes to interpreting the data, some caution is necessary. First, perception of water quality is highly subjective and does not indicate health risk. Second, the classification of water supply sources into piped and other (non-piped) sources offers no indication of water safety, as non-piped sources can also supply safe water provided that they are well managed. The results above therefore indicate that certain water/hygiene/ sanitation services and amenities may be more or less convenient for their users and fit for their intended purpose; but they do not indicate that such services and amenities represent a greater or lesser risk to health.

3.3.3 EE cluster

Socioeconomic, demographic, spatial and ethnic exposure differences

For the analysis of environmental exposure risks, the environmental variables and determinants (describing population subgroups) that were used are shown in Table 12.

Table 12. Variables covered by analyses of inequalities associated with environmental exposure

Environmental variables	Determinants	
Environmental exposure	**Demographic**	**Socioeconomic**
Dilapidated or unhealthy housing	Sex	Education
Crowding	Age	Income quintiles
Coal or wood use for cooking	Household with children	Employment
Coal or wood use for heating	Household size	Financial situation
Bad air quality perception [a]	**Additional determinants**	
Bad soil quality perception [a]	Ethnicity	Municipality
Assumed presence of toxic substances [a]		Urban versus rural

[a] For the assessment of air quality, soil quality and the presence of toxic substances, a five-point ranking scale was used. For the environmental variable used in the analysis described below, the worst option ("very bad") and the second-worst option ("bad") were grouped together.

Many environmental exposure variables show high inequality ratios, and the impact of socioeconomic, demographic, spatial and ethnic determinants is highly variable (see Table 13). Education, income and (to some degree) financial situation are the most powerful socioeconomic factors, while employment seems less significant in the case of environmental exposure. Ethnicity and residential location in urban or rural settings are of key importance, while household size and the presence of children in the home also increase exposure to environmental stressors.

For dilapidated or unhealthy housing and for crowding (serving as proxies for low-quality and stressful physical and psychosocial living environments), the inequality ratios are very large for some of the determinants, as a consequence of the relatively low incidence of these problems in the total population. For some frequently found environmental exposures, the inequality ratios may go down, as in the case of solid fuel use for heating and cooking; this suggests that a general health challenge (rather than an equity challenge) is involved. Still, the more vulnerable population subgroups tend to be significantly more exposed to environmental disadvantages.

For some environmental variables (coal or wood use, and perception of quality of air, quality of soil, and contamination with toxic substances), the pattern of the most exposed group sometimes changes, as the worst environmental conditions are not exclusively reported by the least advantaged subgroups. Such modified

inequalities (marked in Table 13) are found, for example, in the case of perception of air quality, soil quality and toxic contamination, where Serbian citizens report the highest level of pollution. Similarly, people who have higher education report greater problems of air pollution and coal or wood use is most frequently reported in the second-lowest income quintile. It is not possible to assess whether such increased perception of environmental pollution is due to differences in pollution or to differences in environmental awareness.

Environmental exposure inequalities related to urban or rural location are more marked than for housing or water/hygiene/sanitation, and consistently show a rural disadvantage. For use of coal and wood, rural residence provides the highest inequality ratio, showing a stronger impact than socioeconomic determinants.

Table 13. Inequalities associated with environmental exposure variables

Variable	% of total sample	Most advantaged group (%)	Most disadvantaged group (%)	Inequality ratio	Significance level	Most disadvantaged group
Dilapidated/unhealthy housing, stratified by …						
Income quintiles	6.3	0.1	14.0	140.0	<0.001	Lowest quintile
Education	7.9	1.0	14.7	14.7	<0.001	No education
Financial situation	8.6	1.8	21.7	12.1	<0.001	Severe impact
Ethnicity	8.7	2.7	17.4	6.4	<0.001	RAE
Employment	8.7	3.1	12.6	4.1	<0.001	Unemployed
Residential location	8.5	4.6	10.3	2.2	<0.001	Rural
Household size	8.5	5.9	12.3	2.1	<0.001	7+ individuals
Age	8.5	6.3	11.8	1.9	<0.001	Children (0–14)
Crowding, stratified by …						
Household size	9.8	0.1	27.3	273.0	<0.001	7+ individuals
Income quintiles	8.9	0.3	20.5	68.3	<0.001	Lowest quintile
Education	8.4	0.8	19.0	23.8	<0.001	No education
Financial situation	9.7	2.3	26.1	11.3	<0.001	Severe impact
Ethnicity	9.8	2.9	22.2	7.7	<0.001	RAE
Household with children	9.8	1.7	12.2	7.2	<0.001	Yes
Age	9.8	3.6	15.1	4.2	<0.001	Children (0–14)
Employment	8.3	3.0	11.9	4.0	<0.001	Unemployed
Residential location	9.9	6.9	11.1	1.6	<0.001	Rural
Coal or wood used for cooking, stratified by …						
Residential location	71.7	42.8	84.7	2.0	<0.001	Rural
Ethnicity	70.3	43.4	76.7	1.8	<0.001	RAE
Household size	70.4	53.3	83.3	1.6	<0.001	7+ individuals
Income quintiles	65.8	49.9	75.5	1.5	<0.001	Second-lowest [a]
Education	70.6	51.6	75.6	1.5	<0.001	No/basic ed.
Financial situation	70.2	64.4	81.9	1.3	<0.001	Severe impact
Employment	68.6	60.9	73.9	1.2	<0.001	Unemployed
Coal or wood used for heating, stratified by …						
Residential location	80.3	53.9	92.5	1.7	<0.001	Rural
Income quintiles	75.8	55.8	85.1	1.5	<0.001	Second-lowest [a]
Education	79.6	57.6	86.4	1.5	<0.001	No education
Household size	79.4	66.2	90.1	1.4	<0.001	7+ individuals
Employment	76.6	67.8	84.9	1.3	<0.001	Unemployed
Financial situation	79.2	72.2	88.8	1.2	<0.001	Severe impact
Ethnicity	79.4	75.4	87.1	1.2	<0.001	RAE

Variable	% of total sample	Most advantaged group (%)	Most disadvantaged group (%)	Inequality ratio	Significance level	Most disadvantaged group
Perception of bad air quality, stratified by …						
Residential location	59.8	45.4	71.6	1.6	<0.001	Rural
Municipality	61.0	53.4	69.9	1.3	<0.001	Obiliq/Obilić
Ethnicity	60.3	58.9	75.7	1.3	<0.001	Serbian [a]
Household size	60.7	54.5	68.9	1.3	<0.001	7+ individuals
Education	60.6	53.0	64.1	1.2	<0.001	Secondary ed. [a]
Income quintiles	67.3	61.5	73.1	1.2	<0.001	Lowest quintile
Perception of bad soil quality, stratified by …						
Ethnicity	36.8	27.1	59.9	2.2	<0.001	Serbian [a]
Income quintiles	37.5	25.3	48.6	1.9	<0.001	Lowest quintile
Residential location	35.9	30.6	41.1	1.3	<0.001	Rural
Municipality	37.2	32.7	42.2	1.3	<0.001	Obiliq/Obilić
Education	35.2	28.9	37.1	1.3	<0.001	No education
Financial situation	36.8	32.8	41.6	1.3	<0.001	Severe impact
Age	37.2	33.3	40.2	1.2	<0.001	Children (0–14)
Employment	35.5	31.9	37.9	1.2	<0.001	Unemployed
Assumed presence of toxic substances, stratified by …						
Ethnicity	50.4	47.4	72.9	1.5	<0.001	Serbian [a]
Income quintiles	54.8	47.7	61.3	1.3	<0.001	Lowest quintile
Residential location	49.7	47.0	55.7	1.2	<0.001	Rural

[a] In these cases, the worst environmental conditions are reported not by the least advantaged subgroups but by more advantaged groups (for example, second-lowest rather than lowest income quintile; secondary rather than no education, etc.).

To encapsulate the impact of socioeconomic, demographic, spatial and ethnic determinants on environmental risks, an EE score was produced on the basis of six environmental disadvantages:

- dilapidated or unhealthy housing
- crowding
- solid fuel use for both cooking and heating
- perception of bad air quality
- perception of bad soil quality
- assumed presence of toxic substances.

The variables were not weighted, therefore the scores ranged from 0 (no environmental disadvantages at all) to 6 (all six environmental disadvantages). The EE score suggested that 34.3% of the sample have good environmental conditions (no risk, or just one risk, which most often related to solid fuel use or perception of low air quality). Moderate environmental conditions (two or three environmental disadvantages) were reported by 39.4% of the population, and inadequate environmental conditions (four environmental disadvantages or more, indicating multiple exposure to problems in both indoor and outdoor environments) by 26.3%.

The five strongest determinants of inequalities associated with environmental conditions are shown in Table 14.

Table 14. Inequalities associated with inadequate environmental conditions

Variable	% of total sample	Most advantaged group (%)	Most disadvantaged group (%)	Inequality ratio	Significance level	Most disadvantaged group
Inadequate environmental condition [a], stratified by …						
Income quintiles	25.6	12.5	37.0	3.0	<0.001	Lowest quintile
Residential location	26.6	14.5	34.4	2.4	<0.001	Rural
Ethnicity	26.3	20.6	36.4	1.8	<0.001	RAE
Financial situation	26.3	22.1	36.8	1.7	<0.001	Severe impact
Household size	26.3	22.2	36.6	1.6	<0.001	7+ individuals

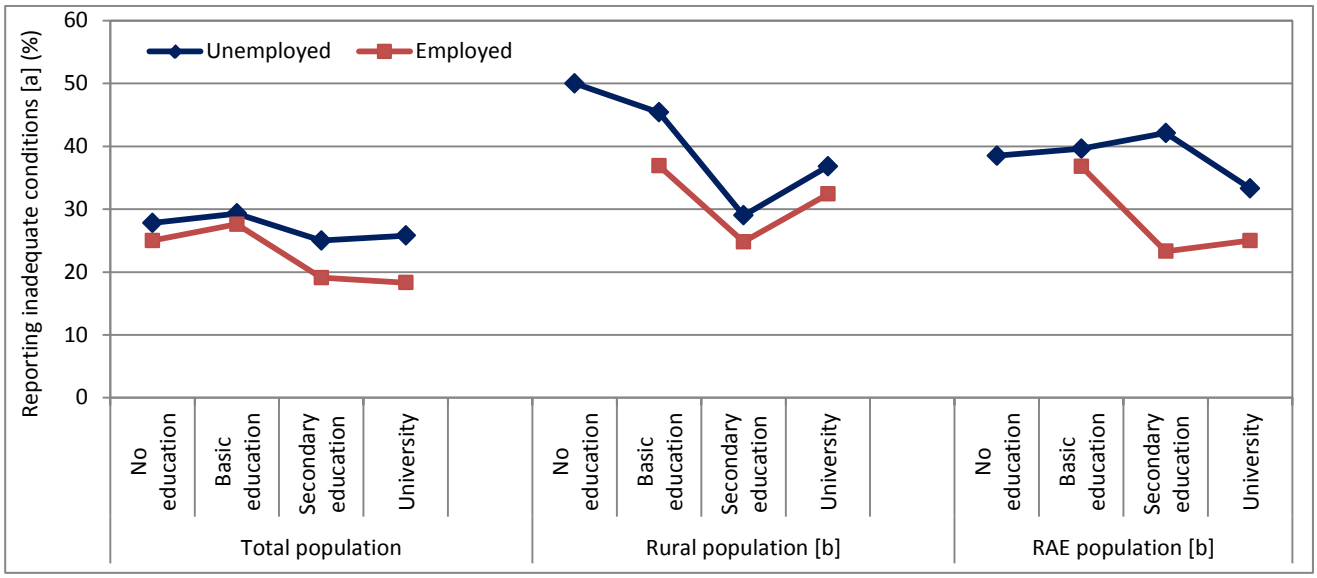
[a] EE score indicating four or more problems.

Compared to other clusters (HS and WHS), there is a strong rural disadvantage for environmental exposure. Also, environmental conditions are much more affected by household size than by education, for example, or employment. Environmental inequalities therefore seem to be more varied and less dependent on socio-economic variables.

Impact of employment on inadequate environmental exposure conditions

To explore the effect of employment (a single determinant which can be affected by policy actions), analysis was carried out on the frequency of inadequate environmental conditions in the case of employed and unemployed individuals within each educational category. The results are shown in Fig. 20; they show a rather low impact of educational categories on environmental conditions and also suggest that employment has only a modest influence on the environmental exposure inequalities. Employment campaigns may thus not be a preferred tool for improving environmental conditions.

Fig. 20. Effect of employment on inadequate environmental conditions



[a] EE score indicating four or more problems.

[b] For both rural and RAE populations, there was an insufficient number of employed individuals without education (n = 1 or 2). The percentages are therefore not reliable and are not shown.

Conclusion

Inequalities in environmental exposure are much more diverse than for housing and water/hygiene/sanitation, with high inequality ratios found not only in relation to ethnicity and income but also in relation to spatial determinants (residential location) and demographic determinants (household size). Unemployment and lack of education play a significant role in the case of such inequalities, as does municipality. While a rural disadvantage in environmental conditions is consistently observed for all environmental disadvantages, there is some variation in relation to ethnic inequalities, as it is not exclusively RAE households that are disadvantaged but also Serbian ones. Inequalities in environmental conditions are therefore affected by a variety of determinants, with spatial and demographic variables much more relevant.

3.3.4 AF cluster

Socioeconomic, demographic, spatial and ethnic exposure differences

Affordability is a key issue for vulnerable households as it affects the ability to purchase goods and services. Affordability, therefore, is both a socioeconomic determinant (as it relates to income and purchasing power) and a vulnerability indicator (as it entails a lack of access to goods and services). To explore affordability issues, the variables (describing affordability features related both to environmental services and needs and to health-related needs) and determinants (describing population subgroups) that were used for the analysis are shown in Table 15.

Table 15. Variables covered by analyses of inequalities associated with affordability

Affordability variables	Determinants	
Affordability	**Demographic**	**Socioeconomic**
Problem affording food	Sex	Education
Problem affording water	Age	Income quintiles
Problem affording energy	Household with children	Employment
Inability to afford medicine	Household size	Financial situation [a]
Disease due to lack of food	**Additional determinants**	
	Ethnicity	Municipality
		Urban versus rural

[a] Financial situation has been used as a socioeconomic determinant to remain consistent with the approach applied in other clusters. However, it could also be used as an indicator of affordability.

Many determinants are associated with a three to five times increase in the reporting of affordability problems related to basic goods and services (see Table 16). The inequality ratios are lower than those found for the other clusters described above. This is due to the higher level of affordability problems within the population and the fact that individuals with good income may still face some affordability problems. Nevertheless, affordability problems are most apparent among individuals in the lowest income quintile (74.2% for food and 80.4% for energy). For diseases caused by lack of food, the inequality ratio between employed and unemployed rises to 41.3. This suggests that the health consequences of affordability problems are much more severe for more disadvantaged households.

For all aspects of affordability, income, financial situation, education, employment and (to a lesser extent) ethnicity are the most powerful determinants, while demographic factors are much less influential and urban–rural variations and differences between the municipalities are insignificant. This suggests that affordability is primarily a socioeconomic concept based on purchasing power and social status; even ethnicity – one of the most important determinants of inequality in other clusters – cannot rival the impact of socioeconomic determinants.

The inequalities in affordability conditions are highly consistent, showing a strong impact of social status but also indicating that good socioeconomic conditions are not necessarily associated with an absence of affordability challenges. The results therefore indicate a need not only to target actions on economically vulnerable subgroups but also to aim to make fundamental goods and services affordable to the whole population.

Table 16. Inequalities associated with affordability variables

Variable	% of total sample	Most advantaged group (%)	Most disadvantaged group (%)	Inequality ratio	Significance level	Most disadvantaged group
Problems affording food, stratified by …						
Income quintiles	42.2	14.2	74.2	5.2	<0.001	Lowest quintile
Financial situation	43.7	16.4	83.7	5.1	<0.001	Severe impact
Education	42.3	16.0	62.2	3.9	<0.001	No education
Ethnicity	43.5	30.3	71.7	2.4	<0.001	RAE
Employment	39.9	25.6	50.8	2.0	<0.001	Unemployed
Household with children	43.9	31.7	47.4	1.5	<0.001	Yes
Age	43.7	35.9	52.4	1.5	<0.001	Children (0–14)
Problems affording water, stratified by …						
Financial situation	47.3	20.1	78.7	3.9	<0.001	Severe impact
Income quintiles	45.3	18.7	67.3	3.6	<0.001	Lowest quintile
Education	46.8	20.3	65.6	3.2	<0.001	No education
Ethnicity	47.2	32.4	65.0	2.0	<0.001	RAE
Employment	44.5	31.1	54.1	1.7	<0.001	Unemployed
Problems affording energy, stratified by …						
Financial situation	55.5	22.9	88.1	3.8	<0.001	Severe impact
Income quintiles	54.9	23.6	80.4	3.4	<0.001	Lowest quintile
Education	54.2	26.6	74.4	2.8	<0.001	No education
Ethnicity	55.1	44.2	77.6	1.8	<0.001	RAE
Employment	52.9	36.8	64.2	1.7	<0.001	Unemployed
Inability to afford medicine, stratified by …						
Financial situation	46.1	19.3	75.0	3.9	<0.001	Severe impact
Income quintiles	45.7	21.8	76.1	3.5	<0.001	Lowest quintile
Education	44.3	22.1	65.9	3.0	<0.001	No education
Ethnicity	46.0	29.1	79.5	2.7	<0.001	RAE
Employment	41.5	26.4	52.1	2.0	<0.001	Unemployed
Household with children	46.5	33.8	50.1	1.5	<0.001	Yes
Disease due to lack of food, stratified by …						
Employment	15.8	0.6	24.8	41.3	<0.001	Unemployed
Income quintiles	15.8	1.3	47.1	36.2	<0.001	Lowest quintile
Education	16.5	1.7	40.9	24.1	<0.001	No education
Financial situation	18.3	3.6	44.0	12.2	<0.001	Severe impact
Ethnicity	18.3	5.7	46.3	8.1	<0.001	RAE
Age	18.4	8.1	26.4	3.3	<0.001	Children (0–14)

To encapsulate the impact of socioeconomic, demographic, spatial and ethnic determinants on affordability, an AF score was produced on the basis of the five variables used above, describing affordability features related both to environmental services and needs and to health-related needs:

- problem affording food
- problem affording water
- problem affording energy
- inability to afford medicine
- disease due to lack of food.

The variables were not weighted, therefore the scores ranged from 0 (no affordability problems at all) to 5 (all five affordability problems). The AF score suggested that 47.2% of the sample have good affordability conditions (no, or just one, affordability problem). Moderate affordability conditions (two or three affordability problems) were reported by 26.1% of the population, and inadequate affordability conditions (four or five affordability problems, indicating severe difficulty in accessing fundamental goods and services) by 26.6%.

The five strongest determinants of inequalities associated with affordability conditions are shown in Table 17.

Table 17. Inequalities associated with inadequate affordability

Variable	% of total sample	Most advantaged group (%)	Most disadvantaged group (%)	Inequality ratio	Significance level	Most disadvantaged group
Inadequate affordability conditions [a], stratified by …						
Financial situation	26.2	4.7	65.1	13.9	<0.001	Severe impact
Income quintiles	23.8	4.3	54.0	12.6	<0.001	Lowest quintile
Education	25.3	5.8	49.4	8.5	<0.001	No education
Ethnicity	26.3	15.5	57.5	3.7	<0.001	RAE
Employment	23.9	10.4	34.7	3.3	<0.001	Unemployed

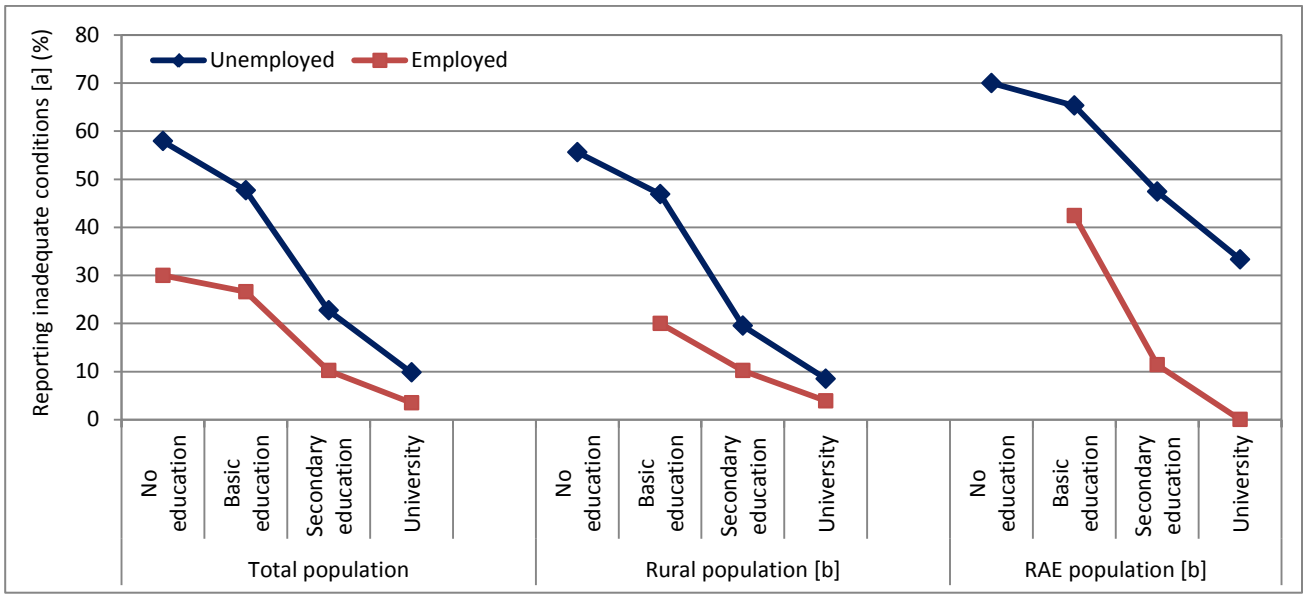
[a] AF score indicating four or more problems.

The result confirms the dominance of socioeconomic determinants as a cause of affordability problems, with the two variables directly related to financial capacity (financial situation and income) the most relevant determinants. Urban–rural variations (23.4% compared to 25%) and municipality (25.9% compared to 26.6%) play virtually no part in affordability variations.

Impact of employment on inadequate affordability conditions

To explore the effect of employment (a single determinant which can be affected by policy actions), analysis was carried out on the frequency of low affordability levels in the case of employed and unemployed individuals within each educational category. The results are shown in Fig. 21 and suggest that employment has a mitigating effect on affordability problems. For all individuals without education, the frequency falls from 57.9% to 30%, and for individuals with basic education, from 47.7% to 26.6%. The same positive effect of being employed is found for rural populations and for RAE, where the disadvantage is even higher. This suggests that employment campaigns for individuals with a low level of education might be a very effective approach to reducing socioeconomic vulnerability, while for RAE this is true irrespective of educational level.

Fig. 21. Effect of employment on inadequate affordability conditions



[a] AF score indicating four or more problems.

[b] For both rural and RAE populations, there was an insufficient number of employed individuals without education (n = 1 or 2). The percentages are therefore not reliable and are not shown.

Conclusion

Concluding the analysis of affordability as an expression of social vulnerability, the most disadvantaged population subgroups are those with a low socioeconomic status as described by income and financial status. Unemployment and a low level of education further add to the socioeconomic disadvantage associated with greater affordability problems, as does ethnicity (RAE being most affected). Compared to the clusters discussed earlier, demographic determinants play a relatively minor role in the case of affordability, while residential location is almost irrelevant.

3.3.5 Settlement areas with the highest environmental vulnerability

Most affected settlement areas in general

Environmental pollution is rarely evenly distributed. In most cases, there are large variations in pollution levels that are caused by distance to specific pollution sources, the type of pollution, and the means by which the pollution is spread (mostly water and air but also soil). In consequence, environmental pollution and exposure are likely to vary between locations, and different settlement areas are likely to have different exposure profiles. Some settlement areas may generally have a fairly low level of pollution; others may show a high level of pollution with a specific pollutant; and yet others may be affected by high levels of various pollutants, making them environmental hot spots.

To identify the settlement areas with the worst perceived pollution, the mean value of four selected environmental variables, together with the mean value of the four cluster scores (HS, WHS, EE, AF), was analysed for all neighbourhoods and settlement areas identified in the database. The results, displayed in Table 18, show

the neighbourhoods where residents reported the worst environmental pollution, or where the cluster scores indicated the most severe problems.

Table 18. Most affected neighbourhoods and settlement areas

Worst perception of environmental pollution	Quantification of worst perception	Most disadvantaged neighbourhoods [a]
Worst perceived air pollution (smell, dust, dirt)	Average value 5 on a scale from 1 (very good) to 5 (very bad)	Faik Mjeku, Ferit Curri, Ismail Qemail, Krushevc, Markovac, Pjeter Bogdani, Qender, Zona Industriale, 1 Tetori, 28 Nentori
Worst perceived soil pollution (proximity to landfills, sewage, etc.)	Average value > 4.5 on a scale from 1 (very good) to 5 (very bad)	Hade, Markovac, Qender
Worst perceived water pollution (public water supply, wells, cisterns, etc.)	Average value > 4.5 on a scale from 1 (very good) to 5 (very bad)	Cameria, Faik Konica, Hade, Konstandin Kristoforidhi, Markovac, Qender, Uglar, Vellezerit Gervalla, Zona Industriale
Worst perceived contamination with dangerous (poisonous or toxic) substances	Average value > 4.5 on a scale from 1 (very good) to 5 (very bad)	Hade, Kalaja, Krushevc, Markovac, Qender, Obiliq i vjetër, Vellezerit Gervalla, Zona Industriale
Worst cluster score rating	**Quantification of worst rating**	**Most disadvantaged neighbourhoods [a]**
Worst HS score	More than two out of four selected housing problems	Lidhja e Pejes, Markovac, Obiliq i vjetër
Worst EE score	More than four out of six selected environmental disadvantages	Hade, Krushevc, Markovac, Qender, Obiliq i vjetër, 1 Tetori
Worst WHS score	More than two out of six selected water/hygiene/sanitation problems	Ferit Curri, Hade, Kalaja, Konstandin Kristoforidhi, Krushevc, M.Pork, Sllatinë e Vogel, Obiliq i vjetër, Uglar
Worst AF score	More than three out of five selected affordability problems	Agron Rama, Cameria, Faik Konica, Markovac, M.Pork, Obiliq i vjetër

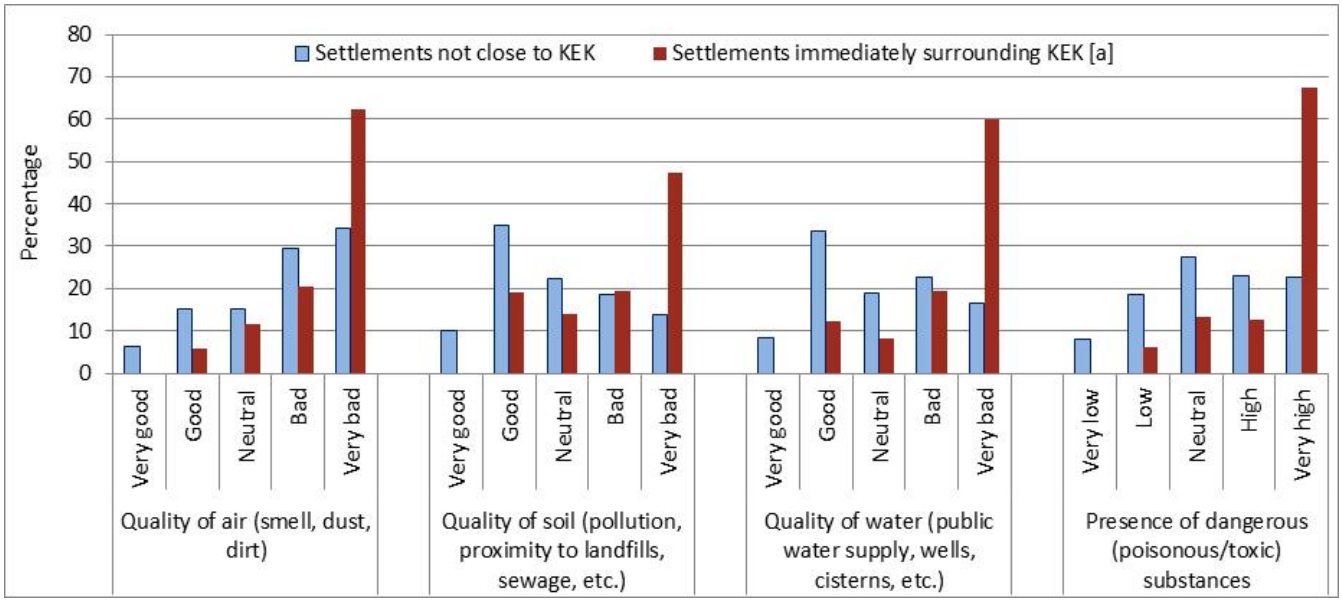
[a] For some neighbourhoods/settlement areas, numbers were provided that could not be matched with settlement names. Also, some settlement areas may have been misspelled and thus wrongly categorized.

Table 18 shows that there are some settlement areas where very bad environmental conditions are reported. Some settlements (such as Hade, Markovac and Qender) are identified as being affected by four or more environmental issues, suggesting that they represent environmental hot spots.

Effect of individual pollution sources on the perception of environmental pollution

Very often, the most polluted settlement areas are close to specific local pollution sources, which may suggest a causal explanation for the elevated environmental pollution levels. One site suitable for such spatial analysis is the KEK lignite coal power plant, which is known to be a major source of environmental pollution affecting water, air and soil. To assess the impact of the power plant on the perception of environmental pollution, the settlement areas surrounding the plant were grouped together and the environmental pollution perception of their residents was compared with residents of settlements not in close proximity to the plant. Fig. 22 shows that, for all types of perceived pollution, residents of settlement areas close to the KEK plant report a much higher level of contamination of their living area than residents of other settlement areas.

Fig. 22. Environmental pollution perception and distance to the KEK power plant



[a] Settlements immediately surrounding the KEK plant area are Bradh i Madh, Graboc, Hade and Krushevc.

The results of the comparison are very clear, but it must be remembered that the data present the residents' perception of environmental pollution. As further steps, these data should be compared with environmental monitoring data. Depending on access to information on the location of other pollution sources (factories, contaminated sites, or unprotected landfills for waste), more detailed analyses could be carried out to reveal the impact of specific pollution sources on the environmental conditions faced by the affected residents.

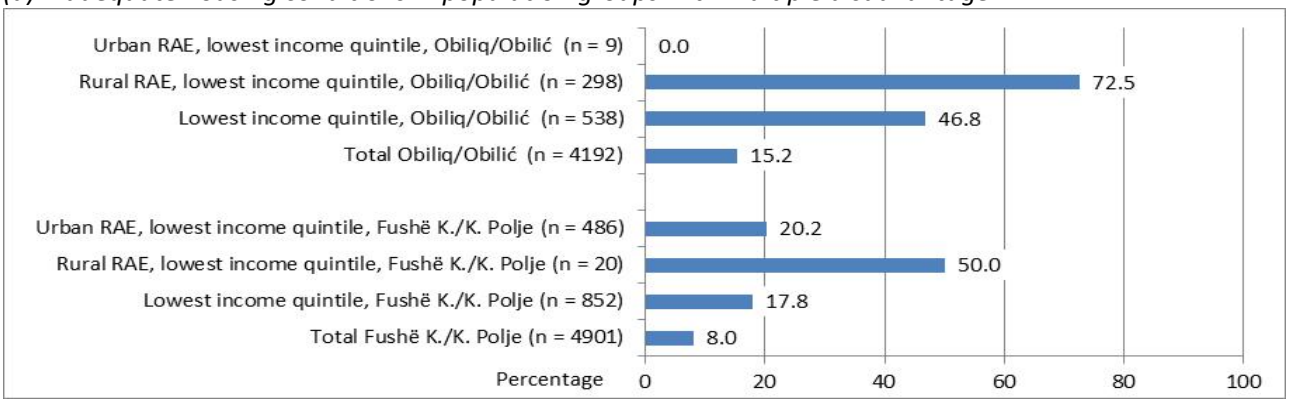
3.3.6 The impact of multiple disadvantage on environmental vulnerability

Socioeconomic, demographic, spatial and ethnic determinants tend to overlap with each other and may lead to population groups being afflicted by multiple disadvantage. For example, poor households are more likely to live in environmentally disadvantaged areas, and as a result of limited education they have less opportunity to gain employment. Such households are thus multiply deprived and often represent the population group in which inequalities are most strongly expressed.

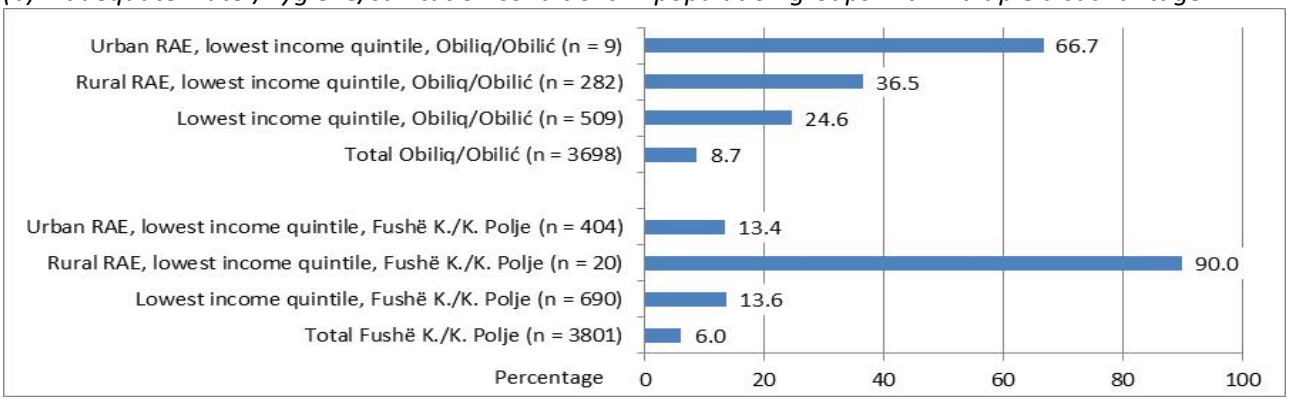
Fig. 23 shows the increasing magnitude of environmental disadvantage when three determinants (urban–rural residence, income quintiles and ethnicity) are combined. The results indicate a sharply rising environmental vulnerability for all four clusters (HS, WHS, EE and AF). Lowest income quintile and RAE ethnicity are associated with a sharp increase in environmental disadvantage, while residential location may bring either a rural or an urban disadvantage depending on the particular environmental variables considered. Although the most affected population group may represent only a very small proportion of the total sample, the strong effect of multiple deprivation calls for specific attention. The results also reveal strong differences between Obiliq/Obilić and Fushë Kosovë/Kosovo Polje with respect to general exposure to environmental disadvantages and the effect of urban and rural residence.

Fig. 23. Increase in environmental vulnerability related to multiple disadvantage, by municipality

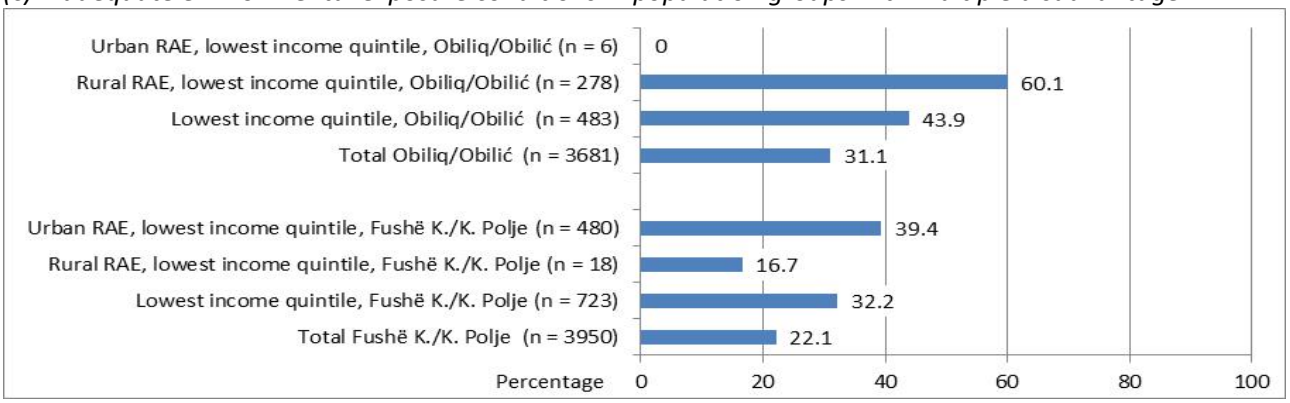
(a) Inadequate housing conditions in population groups with multiple disadvantage



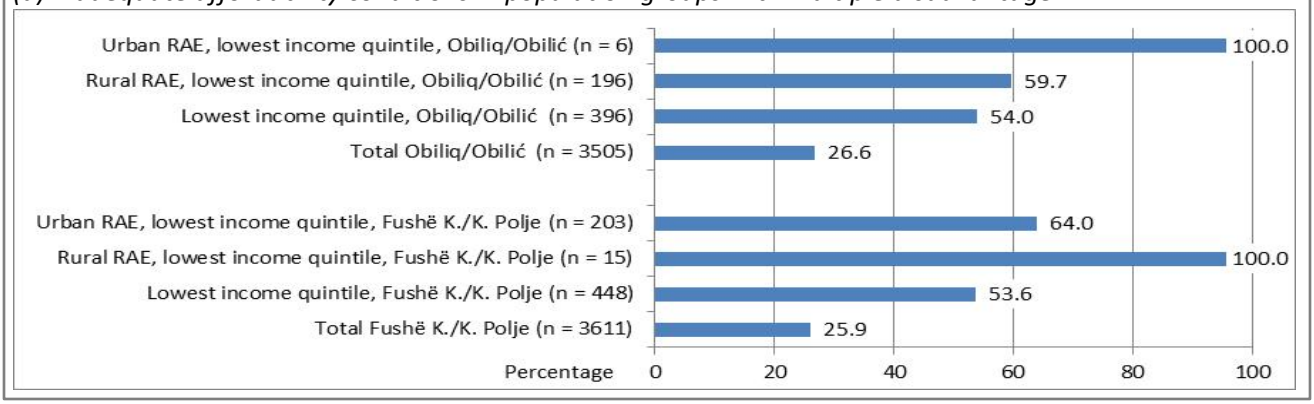
(b) Inadequate water/hygiene/sanitation conditions in population groups with multiple disadvantage



(c) Inadequate environmental exposure conditions in population groups with multiple disadvantage



(d) Inadequate affordability conditions in population groups with multiple disadvantage



As investigation of multiple disadvantage offers a wide variety of combinations of socioeconomic, demographic, spatial and ethnic determinants, further analyses were carried out to assess the impact of various determinant combinations on the level of environmental disadvantage. The detailed results, given in Annex 4, show the impact on each of the four clusters of two different "multiple deprivation scenarios":

- *poverty-based scenario*, combining ethnicity and urban–rural residence with determinants indicating poverty and affordability problems (lowest income quintile, severe financial status, large household);
- *limited-asset-based scenario*, combining ethnicity and urban–rural residence with determinants indicating limited assets and capacities (lack of education and employment).

The results indicate that exposure to environmental disadvantages can reach levels above 80% for the population groups most affected by multiple deprivation.

3.4 Analysis step 4: health impact of environmental inequality and social vulnerability

In the following chapter, the potential health impacts of environmental inequalities are highlighted, with emphasis on the health consequences of increased exposure to environmental risks (defined by WHS, HS and EE scores) and on increased social vulnerability to environmental disadvantages (defined by AF score).

Regrettably, as indicated earlier, the database contains only a few rather general health variables, and as a result of the style of data collection used during the survey,[19] it is impossible to derive disease-specific prevalence data. The variables chosen for the assessment of health impacts are:

- self-reported health status, measured on a five-point scale from "very good" to "very bad";
- most serious illness/health problem suffered by any family member during the last year (based on 12 pre-given diseases);
- presence of a chronic disease/health problem;
- type of chronic disease/health outcome (if present), based on selection from six diseases and five disease groups;
- vaccination coverage.

An additional but very important limitation is that the data collected are self-reported data obtained from residents, rather than objective data derived from health records.

The first step in the health analysis was to compare the impact of the four cluster scores (WHS, EE, HS and AF) on selected health outcomes, using simple cross-tabulations. The second step in the analysis consisted of a logistic regression for the outcome of self-reported health status.

[19] The survey questions asking about specific diseases were prepared as single-choice questions: each question requested the respondent to come up with the most important disease only. It is therefore impossible to derive valid prevalence data for each health outcome or disease. The occurrence of health outcomes is likely to be strongly underestimated.

3.4.1 Descriptive impact of environmental and affordability problems on health

The health outcomes used in the analysis were selected diseases, symptoms and health problems; self-reported health status; and, for the AF score, vaccination coverage. It is to be noted that, as a consequence of the questionnaire design, the data reported below do not represent prevalence data, as only the most serious illness was reported and many other health outcomes are excluded. The data are therefore a rough indication of relative priorities of reported health outcomes and are very likely to underestimate the real prevalence level. It is impossible to quantify the scale of the underestimation.

Impact on diseases and symptoms

In comparison to the total population, individuals reporting various health-related outcomes are more likely to report inadequate conditions with respect to water/hygiene/sanitation, housing, environment and affordability.

- Inadequate housing conditions are reported by 11.6% of the total sample, but tend to occur more frequently in the case of individuals who report that they are suffering from tuberculosis (43.8%), injuries (33.1%), pneumonia (32%) and bronchitis (30.2%).
- Inadequate water/hygiene/sanitation conditions are reported by 7.4% of the total sample, but tend to occur more frequently in the case of individuals who report that they are suffering from skin diseases (25%), poisoning (23.5%) and gastric illness (20%).
- Inadequate environmental conditions are reported by 26.3% of the total sample, but tend to occur more frequently in the case of individuals who report that they are suffering from psychological problems (58.6%), tuberculosis (56.3%), poisoning (54.5%) and skin diseases (42.9%).
- Inadequate affordability conditions are reported by 26.6% of the total sample, but tend to occur more frequently in the case of individuals who report that they are suffering from bronchitis (47.1%), injuries (40.5%) and tuberculosis (100% – in other words, all reported tuberculosis cases are associated with the lowest affordability).

It should be noted that the results are based on rather low case numbers for the given diseases. For common diseases such as cold or influenza, no increased association with specific inadequate conditions was found.

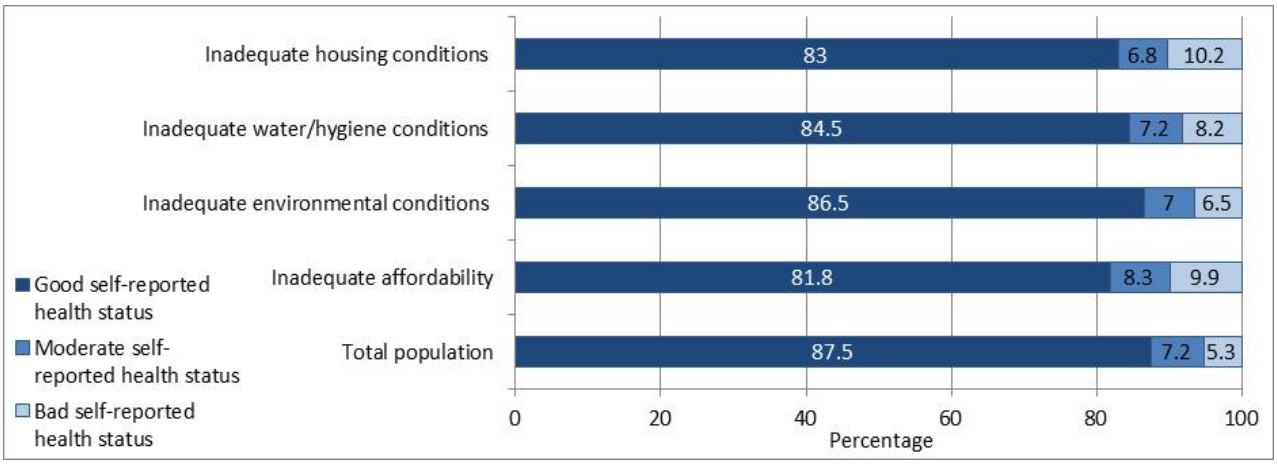
The findings do not necessarily indicate a direct link, or even a causal link, between a certain condition and a certain health outcome. Rather, it is much more likely that inadequate conditions are reported more frequently by socially vulnerable households and that such households are also more likely to report diseases or symptoms of ill health.

Impact on self-reported health status

Self-reported health status was available for more than 90% of the total sample and shows some variations associated with environmental disadvantage. Fig. 24 indicates that, in comparison to the total population, increased reporting of bad health is found in all cluster scores when conditions are assessed as inadequate. The smallest increase (though still statistically significant, at a 95% confidence interval (CI) level) is found for

inadequate environmental conditions, while inadequate affordability and housing conditions are associated with a higher increase, with almost twice as many people self-reporting bad health.

Fig. 24. Variations in self-reported health status by cluster score



To assess the combined impact of housing, water/hygiene/sanitation, environmental exposure and affordability on self-reported health status, the four clusters were merged into one general "vulnerability score". Computed as a simple addition of the four individual cluster scores, the vulnerability score ranges from 0 (indicating individuals with no problems related to the HS, WHS, EE and AF cluster scores) to 20 (indicating individuals with all the problems and risks covered by the individual cluster scores). The vulnerability score was then categorized into four groups (see Table 19).

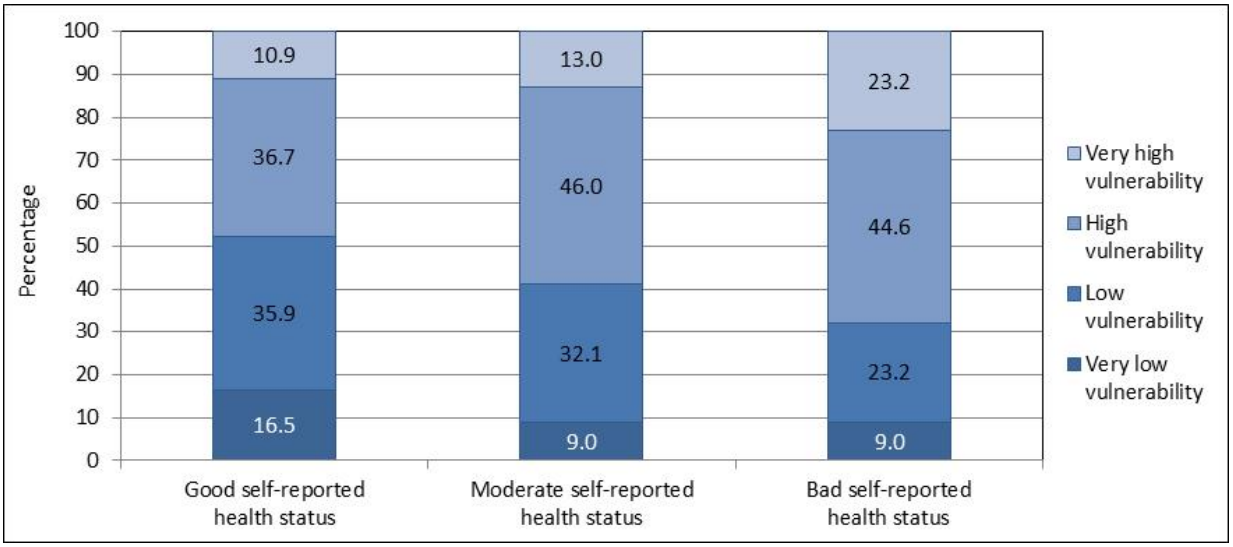
Table 19. Sample distribution into general vulnerability categories

General vulnerability category	% of population
Very low vulnerability (0–2 risks/problems)	15.5
Low vulnerability (3–5 risks/problems)	34.1
High vulnerability (6–9 risks/problems)	36.4
Very high vulnerability (10 or more risks/problems)	14.0

As a consequence of the many variables used and the accumulation of missing cases, the general vulnerability score could only be produced for 50% of the sample (n = 4746). The findings presented below should therefore be considered indicative only.

The impact of the general vulnerability score on variations in self-reported health status is highly significant. Fig. 25 shows that 23.2% of all individuals with bad self-reported health status registered a very high vulnerability score, while only 10.9% of those reporting a good health status had very high vulnerability. Less than a third of individuals with bad self-reported health status had a low or very low vulnerability score, compared to more than 50% of individuals with good self-reported health status.

Fig. 25. Vulnerability levels of population within self-reported health status categories

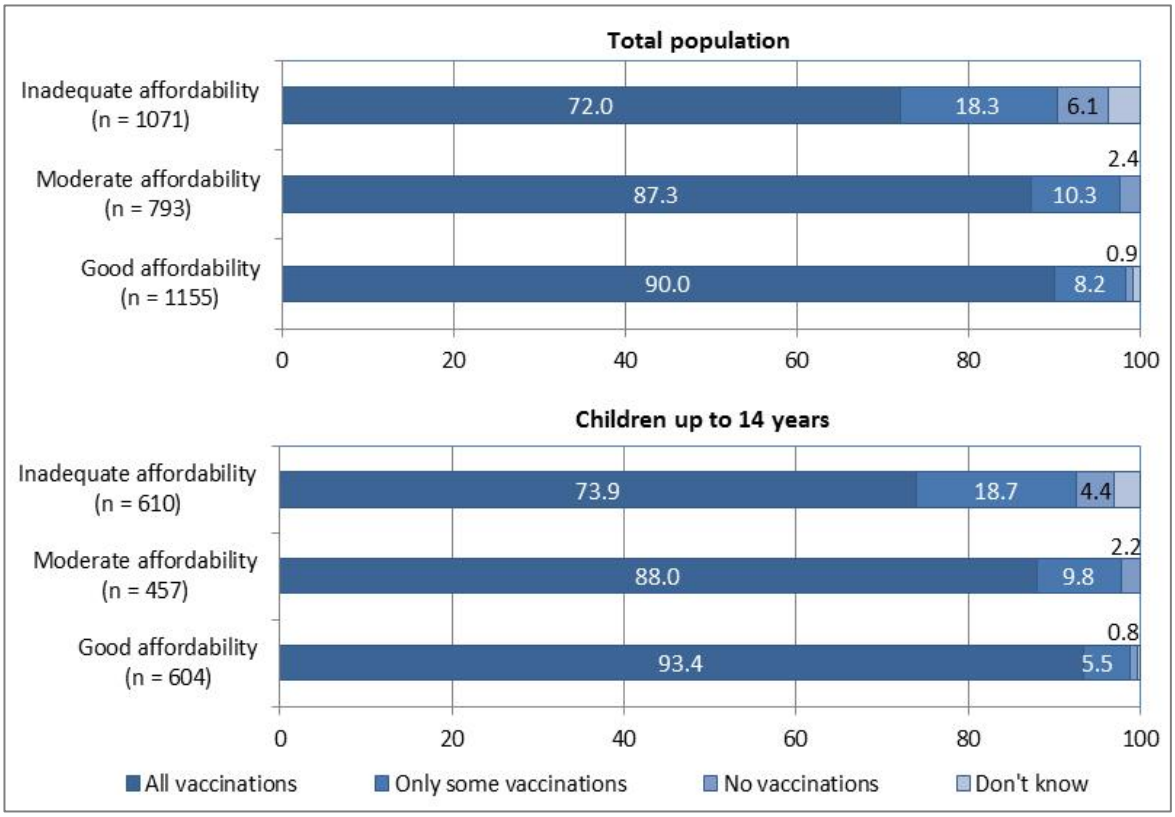


Impact of affordability levels on vaccination

For the total population, there is a much lower percentage of full vaccination coverage for individuals affected by low affordability conditions (72%) than for individuals with good affordability (90%), with 6.1% of the individuals with affordability problems having no vaccination at all (see Fig. 26). For children (up to 14 years of age), the results are slightly better, as 73.9% of all children living in families with affordability constraints have received all vaccinations, and the percentage of children in such families without any vaccination has fallen to 4.4%. The relatively small percentages of unvaccinated children indicate that vaccination campaigns and services are capable of reaching the most disadvantaged groups. However, there is a more than fivefold increase (0.8% to 4.4%) in unvaccinated children between good and inadequate affordability conditions, so clearly there is still room for improvement.

Looking at the specific target group of RAE, the percentage of individuals without vaccination is higher than for the total sample, standing at 0.9%, 5.9% and 8.1%, respectively, for individuals with good, moderate and inadequate affordability. Only 62% of RAE with inadequate affordability conditions (compared to 72% of the total sample) report full vaccination coverage. For RAE children up to 14 years, vaccination rates are slightly higher. Overall, 66.6% of all RAE children living in households with inadequate affordability levels are fully vaccinated, while 5.7% have not received any vaccination at all. These data show that vaccination coverage is somewhat lower in poor RAE children, but that the effect of affordability problems on vaccination coverage in the RAE population is relatively small.

Fig. 26. Vaccination coverage for total population and children by AF score



3.4.2 Relative influence of social and environmental conditions on self-reported health status

The final step in the analysis of the health impacts of social and environmental vulnerability consisted of a logistic regression analysis which aimed to quantify the association of environmental, socioeconomic, demographic, spatial and ethnic factors with bad self-reported health status. As environmental variables for the regression, the following were used:

- the individual variables on housing services, water/hygiene/sanitation, environmental exposure and affordability that were used to generate the four cluster scores (HS, WHS, EE and AF);
- the four cluster scores as more generic indicators of environmental disadvantage and affordability conditions.

The association of the variables and/or the cluster scores with bad self-reported health status was compared with the health association of major known health determinants (sex, age, financial problems, education) as well as urban–rural residence and ethnicity. Income and employment were not included as health determinants because of the large number of cases with missing information.[20] The same limitation (small

[20] For employment: 59.5% of cases with missing information/not of working age; for income: 24.8% of cases with missing information.

number of cases) applied to other health outcome and disease data; self-reported health status was therefore the only health variable for which logistic regression modelling was feasible.

It is important to note that the results of the regression model can only indicate whether a certain environmental or social determinant and bad self-reported health status are associated and whether this association is statistically significant when other relevant variables in the model are taken into account. The results cannot, therefore, indicate any causality between a particular determinant and self-reported health status; the association may instead be explained by confounding factors that were not included in the model.

The health impact of individual environmental and affordability risks

For this logistic regression model, individual variables indicating environmental disadvantage or exposure were applied. With the exception of two variables from the AF cluster,[21] all variables from the four clusters were used for the regression. The logistic regression models were run in two steps for the variables of each cluster: in the first step the association of particular risk factors with variations in bad self-reported health status were analysed;[22] in the second step socioeconomic, demographic, spatial and ethnic determinants (defined as covariates within the regression) were added to the model to test whether some of the health variations observed were associated with those determinants. The models produced odds ratios (OR) and their confidence interval (CI) values for each covariate, indicating whether the odds of bad self-reported health status occurring were higher or lower for the different values covered by the respective covariate.[23] The addition of the socioeconomic, demographic, spatial and ethnic covariates was expected to decrease the strength of the association of the environmental variables with bad self-reported health status.

As the number of missing cases (affecting the validity of the results) rises with the number of variables included in the logistic regression, a separate model was run for each of the clusters. Tables 20 to 23 present the results of the logistic regression analysis for the variables of each cluster.

Table 20 shows the regression results for the variables of the HS cluster, comparing the odds of bad self-reported health status for individuals not affected by a given housing problem (considered the reference with an OR value of 1.0) with the odds of individuals with a given housing problem reporting bad health. Looking at the housing services variables only, not having a bed for all residents is associated with an OR value of 2.3, which means that the odds of bad self-reported health status are more than twice as high as they are for residents of households with a sufficient number of beds (no causal relationship is implied). For all other housing problems, there is no significant change in self-reported health status.

The adjusted model takes into account the influence of six covariates (sex, age, urban–rural residence, financial problems, education and ethnicity). Not having a bed for each household member remains significantly

[21] The two variables – "problem affording medicine" and "famine-related disease because of problem affording food" – were excluded because of their direct link with health outcomes.

[22] Bad self-reported health status, as used in the regression models, comprised the answer options "bad" and "very bad", on the one hand, and "good" and "very good" on the other. Moderate self-reported health was excluded.

[23] OR values indicate how much a certain variable in the logistic regression model has an impact on the depending variable – in this case, bad self-reported health. Values lower than 1 indicate reduced odds of bad self-reported health, while values higher than 1 indicate increased odds of bad self-reported health. The odds can also be interpreted as the "chance" of being in a state of bad self-reported health.

associated with bad self-reported health status, although the strength of association is reduced. However, the results show that socioeconomic and demographic determinants are associated with much larger variations in self-reported health status, with age and education showing the strongest associations. Rural residence and financial problems are also associated with higher odds of bad self-reported health status, but the strength of association is lower than for age and education. Ethnicity and sex have no significant association with variations in self-reported health status (and are therefore not displayed in the table).

Table 20. Regression model results for housing services variables and bad self-reported health status

Model not adjusted for covariates (n = 8059)				*Model adjusted for covariates [a] (n = 5789)*			
Input data	**Values**	**OR**	**CI (95%)**	**Input data**	**Values**	**OR**	**CI (95%)**
Electricity available	Yes	Reference		Electricity available	Yes	Reference	
	No	0.9	0.5–1.4		No	0.7	0.3–1.1
Stove available	Yes	Reference		Stove available	Yes	Reference	
	No	1.3	0.9–1.8		No	0.9	0.5–1.5
A bed for each occupant	Yes	Reference		A bed for each occupant	Yes	Reference	
	No	**2.3**	**1.8–2.9**		**No**	**1.9**	**1.2–2.8**
Fridge available	Yes	Reference		Fridge available	Yes	Reference	
	No	1.1	0.8–1.5		No	0.7	0.4–1.2
No covariates included				Urban–rural residence	Urban	Reference	
					Rural	**1.5**	**1.1–2.1**
				Financial problems	No problems	Reference	
					Some problems	**2.1**	**1.5–2.9**
					Severe problems	**4.3**	**2.9–6.3**
				Age	0–14	Reference	
					15–64	**8.0**	**4.6–13.9**
					65 and older	**75.3**	**41.3–137.4**
				Education	University	Reference	
					Secondary education	**4.4**	**1.4–14.1**
					Basic education	**8.9**	**2.8–28.6**
					No education	**21.6**	**6.4–72.7**

[a] Modelled with sex, age, urban–rural residence, financial problems, education and ethnicity as covariates. Bold figures represent results that are statistically significant. Only covariates with significant results are displayed in the table.

Table 21 presents the logistic regression results for the variables of the EE cluster. The unadjusted model, which considers only the impact of the environmental variables on self-reported health status, shows a significant association between increased bad self-reported health status and use of solid fuel, inadequate housing and crowding; there is also an association between decreased bad self-reported health status and perceived air pollution. However, inclusion of the covariates in the adjusted model dissolves most of these associations between environmental disadvantages and bad self-reported health status; only solid fuel use remains significantly associated with increased reporting of bad health. The association between solid fuel use and bad health remains almost as strong as in the unadjusted model, indicating that socioeconomic and demographic determinants have little effect on this association. Of the other covariates, age and education show the strongest association with bad self-reported health status, while ethnicity and sex play no role.

Table 21. Regression model results for environmental exposure variables and bad self-reported health status

Model not adjusted for covariates (n = 6414)				*Model adjusted for covariates [a] (n = 4606)*			
Input data	**Values**	**OR**	**CI (95%)**	**Input data**	**Values**	**OR**	**CI (95%)**
Solid fuel use	No	Reference		Solid fuel use	No	Reference	
	Yes	**2.4**	**1.5–3.6**		**Yes**	**2.3**	**1.3–4.1**
Inadequate housing	No	Reference		Inadequate housing	No	Reference	
	Yes	**1.5**	**1.0–2.0**		Yes	0.8	0.5–1.3
Crowding	No	Reference		Crowding	No	Reference	
	Yes	**1.4**	**1.0–1.9**		Yes	0.9	0.6–1.4
Air quality perceived as bad	No	Reference		Air quality perceived as bad	No	Reference	
	Yes	**0.6**	**0.5–0.9**		Yes	0.7	0.5–1.0
Soil quality perceived as bad	No	Reference		Soil quality perceived as bad	No	Reference	
	Yes	1.2	0.9–1.7		Yes	1.2	0.8–1.8
Perception of toxic contamination	No	Reference		Perception of toxic contamination	No	Reference	
	Yes	1.1	0.8–1.5		Yes	1.0	0.7–1.6
No covariates included				Urban–rural residence	Urban	Reference	
					Rural	**1.9**	**1.2–2.9**
				Financial problems	No problems	Reference	
					Some problems	**2.0**	**1.4–2.9**
					Severe problems	**4.3**	**2.8–6.7**
				Age	0–14	Reference	
					15–64	**9.0**	**4.8–17.2**
					65 and older	**86.6**	**43.4–172.9**
				Education	University	Reference	
					Secondary education	**5.0**	**1.2–20.7**
					Basic education	**10.4**	**2.5–42.9**
					No education	**23.4**	**5.4–101.8**

[a] Modelled with sex, age, urban–rural residence, financial problems, education and ethnicity as covariates. Bold figures represent results that are statistically significant. Only covariates with significant results are displayed in the table.

Table 22 presents the results for the water/hygiene/sanitation variables; these indicate that three water and hygiene variables are associated with increased levels of bad self-reported health status in the unadjusted model, only one of which (perception of quantity of supplied water) remains significant in the adjusted model. For perception of water quality, the OR value remains elevated (OR 1.5), but as the inclusion of covariates leads to a wider CI, the OR becomes statistically insignificant. The fact that water source is not significantly associated with bad self-reported health status suggests that in the two municipalities water quality and quantity problems are not directly related to a certain type of water supply. Regarding the influence of the other covariates on bad self-reported health status, the same trend emerges as for environmental exposure, with age and education being the most significant, followed by financial problems and rural residence. Sex and ethnicity have no influence.

Table 22. Regression model results for water/hygiene/sanitation variables and bad self-reported health status

Model not adjusted for covariates (n = 6607)				*Model adjusted for covariates [a] (n = 5012)*			
Input data	**Values**	**OR**	**CI (95%)**	**Input data**	**Values**	**OR**	**CI (95%)**
Perceived water quality	Adequate quality	Reference		Perceived water quality	Adequate quality	Reference	
	Inadequate quality	**1.5**	**1.1–2.0**		Inadequate quality	1.5	0.9–2.4
Perceived water quantity	Adequate quantity	Reference		Perceived water quantity	Adequate quantity	Reference	
	Inadequate quantity	**2.7**	**2.0–3.8**		**Inadequate quantity**	**2.7**	**1.8–4.0**
Shower or bath	Available	Reference		Shower or bath	Available	Reference	
	Not available	**1.8**	**1.1–2.9**		Not available	0.6	0.3–1.2
Sewage system	Connected	Reference		Sewage system	Connected	Reference	
	Not connected	1.6	0.9–2.5		Not connected	1.0	0.5–2.0
Toilet in dwelling	Yes	Reference		Toilet in dwelling	Yes	Reference	
	No	0.7	0.4–1.1		No	0.6	0.4–1.1
Water supply source	Piped	Reference		Water supply source	Piped	Reference	
	Other (non-piped)	0.8	0.6–1.1		Other (non-piped)	1.0	0.7–1.4
No covariates included				Urban–rural residence	Urban	Reference	
					Rural	**1.5**	**1.1–2.2**
				Financial problems	No problems	Reference	
					Some problems	**2.1**	**1.4–3.0**
					Severe problems	**4.8**	**3.3–7.2**
				Age	0–14	Reference	
					15–64	**10.7**	**5.4–21.6**
					65 and older	**109.0**	**52.3–229.5**
				Education	University	Reference	
					Secondary education	**6.2**	**1.5–25.7**
					Basic education	**11.3**	**2.7–46.9**
					No education	**27.1**	**6.2–117.6**

[a] Modelled with sex, age, urban–rural residence, financial problems, education and ethnicity as covariates. Bold figures represent results that are statistically significant. Only covariates with significant results are displayed in the table.

Finally, Table 23 shows the findings for the AF cluster. In the unadjusted model, it is only problems affording food that are significantly associated with an increased self-reporting of bad health (OR 2.3). This changes in the adjusted model, as problems affording food (OR 1.6) are not statistically significant, while problems affording water now show a significant association (OR 1.7) with bad self-reported health status. The results show that problems affording water have an independent association with increased levels of bad self-reported health status.

Table 23. Regression model results for affordability variables and bad self-reported health status

Model not adjusted for covariates (n = 7006)				*Model adjusted for covariates [a] (n = 5196)*			
Input data	**Values**	**OR**	**CI (95%)**	**Input data**	**Values**	**OR**	**CI (95%)**
Problems affording food	No	Reference		Problems affording food	No	Reference	
	Yes	**2.3**	**1.6–3.4**		Yes	1.6	0.9–2.6
Problems affording water	No	Reference		Problems affording water	No	Reference	
	Yes	1.4	0.9–2.0		**Yes**	**1.7**	**1.1–2.9**
Problems affording energy	No	Reference		Problems affording energy	No	Reference	
	Yes	1.0	0.7–1.3		Yes	0.8	0.5–1.2
No covariates included				Urban–rural residence	Urban	Reference	
					Rural	**1.7**	**1.2–2.4**
				Financial problems	No problems	Reference	
					Some problems	**2.0**	**1.4–2.9**
					Severe problems	**4.0**	**2.6–6.3**
				Age	0–14	Reference	
					15–64	**10.0**	**5.3–19.0**
					65 and older	**95.4**	**48.2–188.7**
				Education	University	Reference	
					Secondary education	**3.7**	**1.2–12.0**
					Basic education	**7.5**	**2.4–24.3**
					No education	**18.2**	**5.4–61.8**

[a] Modelled with sex, age, urban–rural residence, financial problems, education and ethnicity as covariates. Bold figures represent results that are statistically significant. Only covariates with significant results are displayed in the table.

In summary, the results of the logistic regression models presented above suggest that some environmental determinants have a statistically significant association with bad self-reported health status that is independent of the influence of socioeconomic, demographic, spatial and ethnic determinants. The environmental disadvantages that do show such an independent association with increased bad self-reported health status are as follows:

- in the HS cluster: not having a bed for each household member (OR value 1.9);
- in the EE cluster: use of solid fuels (OR value 2.3);
- in the WHS cluster: perception of water quantity as inadequate (OR value 2.7);
- in the AF cluster: problems affording water (OR value 1.7).

These OR values indicate that individuals exposed to the environmental health determinants concerned have a statistical chance of reporting bad health that may be more than twice as high as that of non-exposed individuals. However, these associations do not provide any indication of a causal relationship between the various determinants and health, as they could be explained by factors not considered in the models. Furthermore, it must be remembered that self-reported health status is a very vague health indicator and thus not an ideal one on which to rely.

The health impact of the cluster scores

Similar logistic regression models were run with the four cluster scores, merging a variety of environmental conditions within each cluster. In the first step the direct association of the particular cluster score with bad

self-reported health status was analysed; in the second step the socioeconomic, demographic, spatial and ethnic determinants (defined as covariates within the regression) were added to the model.

Table 24 shows the regression results for the HS score; they indicate that inadequate housing is not associated with higher self-reporting of bad health in the adjusted model, although it is highly significant in the unadjusted model. The reduction of the relevant OR value from 2.8 to 1.0 shows the strong health impact of the covariates included in the adjusted model. Of the six determinants used as covariates, four show a significant association with the self-reporting of bad health. Age is the dominant determinant, followed by education; rural residence and financial problems are also associated with higher odds of bad self-reported health status, but their influence is much smaller.

Table 24. Regression model results for housing services and bad self-reported health status

Model not adjusted for covariates (n = 8059)				*Model adjusted for covariates [a] (n = 5789)*			
Input data	**Values**	**OR**	**CI (95%)**	**Input data**	**Values**	**OR**	**CI (95%)**
HS score	Good housing	Reference		HS score	Good housing	Reference	
	Moderate housing	**2.5**	**2.0–3.2**		**Moderate housing**	**2.0**	**1.3–2.9**
	Inadequate housing	**2.8**	**2.2–3.5**		Inadequate housing	1.0	0.6–1.7
No covariates included				Urban–rural residence	Urban	Reference	
					Rural	**1.6**	**1.2–2.2**
				Financial problems	No problems	Reference	
					Some problems	**2.1**	**1.5–3.0**
					Severe problems	**4.4**	**3.0–6.4**
				Age	0–14	Reference	
					15–64	**8.0**	**4.6–13.9**
					65 and older	**77.0**	**42.2–140.4**
				Education	University	Reference	
					Secondary education	**4.4**	**1.4–14.0**
					Basic education	**8.9**	**2.8–28.5**
					No education	**21.6**	**6.5–72.7**

[a] Modelled with sex, age, urban–rural residence, financial problems, education and ethnicity as covariates. Bold figures represent results that are statistically significant. Only covariates with significant results are displayed in the table.

For the EE score (see Table 25), the unadjusted model already suggests a weak association between environmental exposure and self-reported health outcomes. The addition of the socioeconomic, demographic, spatial and ethnic covariates further reduces the OR values for environmental exposure. Again, four covariates are significantly associated with bad self-reported health status, especially advanced age and low education, which show the strongest association.

Table 25. Regression model results for environmental exposure and bad self-reported health status

Model not adjusted for covariates (n = 6735)				*Model adjusted for covariates [a] (n = 4766)*			
Input data	**Values**	**OR**	**CI (95%)**	**Input data**	**Values**	**OR**	**CI (95%)**
EE score	Good environment	Reference		EE score	Good environment	Reference	
	Moderate environment	1.0	0.8–1.2		Moderate environment	0.7	0.5–1.1
	Inadequate environment	1.2	0.9–1.6		Inadequate environment	0.8	0.5–1.2
No covariates included				Urban–rural	Urban	Reference	
					Rural	**1.9**	**1.3–2.8**
				Financial problems	No problems	Reference	
					Some problems	**1.9**	**1.4–2.8**
					Severe problems	**3.9**	**2.6–5.0**
				Age	0–14	Reference	
					15–64	**9.5**	**5.0–18.0**
					65 and older	**89.9**	**45.2–178**
				Education	University	Reference	
					Secondary education	**5.5**	**1.3–22.8**
					Basic education	**11.1**	**2.7–45.9**
					No education	**27.3**	**6.3–118**

[a] Modelled with sex, age, urban–rural residence, financial problems, education and ethnicity as covariates. Bold figures represent results that are statistically significant. Only covariates with significant results are displayed in the table.

The regression results for the WHS score (see Table 26) indicate that inadequate water/hygiene/sanitation conditions have a significant association with bad self-reported health status in the unadjusted model, increasing the odds of bad self-reported health status to 1.7. However, the adjusted model, which includes the socioeconomic, demographic, spatial and ethnic determinants as covariates, makes the association between water/hygiene/sanitation conditions and bad self-reported health status insignificant. As in the other regression models, age and low education strongly increase the odds of bad self-reported health status, while rural residence and financial problems show a less strong association. Sex and ethnicity play no role in variations in self-reported health status.

Table 26. Regression model results for water/hygiene/sanitation conditions and bad self-reported health status

Model not adjusted for covariates (n = 6607)				*Model adjusted for covariates [a] (n = 5012)*			
Input data	**Values**	**OR**	**CI (95%)**	**Input data**	**Values**	**OR**	**CI (95%)**
WHS score	Good WHS	Reference		WHS score	Good WHS	Reference	
	Moderate WHS	1.0	0.8–1.3		Moderate WHS	1.1	0.8–1.5
	Inadequate WHS	**1.7**	**1.2–2.5**		Inadequate WHS	0.8	0.5–1.2
No covariates included				Urban–rural residence	Urban	Reference	
					Rural	**1.5**	**1.1–2.1**
				Financial problems	No problems	Reference	
					Some problems	**2.2**	**1.5–3.1**
					Severe problems	**5.0**	**3.4–7.5**
				Age	0–14	Reference	
					15–64	**11.1**	**5.5–22.3**
					65 and older	**104.6**	**50.1–218.5**
				Education	University	Reference	
					Secondary education	**6.1**	**1.5–25.0**
					Basic education	**10.7**	**2.6–44.2**
					No education	**25.7**	**5.9–111.1**

[a] Modelled with sex, age, urban–rural residence, financial problems, education and ethnicity as covariates. Bold figures represent results that are statistically significant. Only covariates with significant results are displayed in the table.

Finally, the regression models for affordability and bad self-reported health status, shown in Table 27, indicate that lower levels of affordability are associated with increased odds of bad self-reported health status in both models, although the OR values are lower in the adjusted model. This suggests that socioeconomic aspects of the affordability of environmental goods and services (such as food, water, energy and medicine) have a more stable association with bad self-reported health status than the environment-focused scores for housing services, environmental exposure and water/hygiene, which became insignificant when the covariates were added to the model. However, as in the earlier models, the same four covariates – advanced age, low education, financial problems and rural residence – are associated with higher levels of bad self-reported health status.

Table 27. Regression model results for affordability and bad self-reported health status

Model not adjusted for covariates (n = 6319)				*Model adjusted for covariates [a] (n = 4721)*			
Input data	**Values**	**OR**	**CI (95%)**	**Input data**	**Values**	**OR**	**CI (95%)**
AF score	Good affordability	Reference		AF score	Good affordability	Reference	
	Moderate affordability	**2.3**	**1.7–3.0**		**Moderate affordability**	**1.8**	**1.2–2.6**
	Inadequate affordability	**3.8**	**3.0–4.9**		**Inadequate affordability**	**2.2**	**1.4–3.4**
No covariates included				Urban–rural residence	Urban	Reference	
					Rural	**1.7**	**1.2–2.3**
				Financial problems	No problems	Reference	
					Some problems	**1.7**	**1.1–2.5**
					Severe problems	**3.3**	**2.1–5.2**
				Age	0–14	Reference	
					15–64	**9.4**	**4.9–17.8**
					65 and older	**91.7**	**46.1–182.2**
				Education	University	Reference	
					Secondary education	**3.5**	**1.1–11.4**
					Basic education	**7.6**	**2.3–24.4**
					No education	**16**	**4.7–54.8**

[a] Modelled with sex, age, urban–rural residence, financial problems, education and ethnicity as covariates. Bold figures represent results that are statistically significant. Only covariates with significant results are displayed in the table.

The results achieved by combining all cluster scores into one general vulnerability score for the regression model are given in Table 28. High and very high vulnerability are associated with significantly higher odds of bad self-reported health status in the unadjusted model (OR values of 2.2 and 3.9), but this changes in the adjusted model, where OR values for high and very high vulnerability remain increased (1.5 and 1.3), but are not statistically significant. Regarding the association of socioeconomic, demographic, spatial and ethnic determinants with bad self-reported health status, there is no significant association found for sex, ethnicity and urban–rural variations. Age and low education remain strongly associated with bad self-reported health status, and financial problems are also a significant contributory factor.

Table 28. Regression model results for general vulnerability and bad self-reported health status

Model not adjusted for covariates (n = 4127)				*Model adjusted for covariates [a] (n = 3258)*			
Input data	**Values**	**OR**	**CI (95%)**	**Input data**	**Values**	**OR**	**CI (95%)**
Vulnerability score	Very low vulnerability	Reference		Vulnerability score	Very low vulnerability	Reference	
	Low vulnerability	1.2	0.7–2.0		Low vulnerability	1.0	0.5–1.7
	High vulnerability	**2.2**	**1.4–3.6**		High vulnerability	1.5	0.8–2.6
	Very high vulnerability	**3.9**	**2.3–6.5**		Very high vulnerability	1.3	0.6–2.9
No covariates included				Financial problems	No problems	Reference	
					Some problems	**1.6**	**1.1–2.5**
					Severe problems	**3.6**	**2.2–5.9**
				Age	0–14	Reference	
					15–64	**22.7**	**7.0–73.3**
					65 and older	**224.4**	**67.3–747.8**
				Education	University	Reference	
					Secondary education	**8.7**	**1.2–63.5**
					Basic education	**15.6**	**2.1–114.8**
					No education	**30.4**	**3.9–236.8**

[a] Modelled with sex, age, urban–rural residence, financial problems, education and ethnicity as covariates. Bold figures represent results that are statistically significant. Only covariates with significant results are displayed in the table.

Overall, the logistic regression analysis based on cluster scores suggests that socioeconomic and demographic determinants, especially age and education, have the strongest association with health variations in the surveyed population, followed by financial condition and urban–rural variations. The more environmentally focused cluster scores (HS, EE and WHS) have a relatively weak association with variations in bad self-reported health status when considered together with the socioeconomic and demographic determinants. The fact that the AF score was the only cluster score that remained significant in the adjusted models suggests that social vulnerability is more strongly associated with bad self-reported health status than environmental vulnerability.

Summary of logistic regression analyses

The regression analyses indicate that socioeconomic and demographic determinants have a stronger association with self-reported health status than environmental determinants. This finding is valid for each regression model and explains why the AF score, which includes more social and health-related variables, is the most "influential" score. However, the results also show that there are some environmental disadvantage parameters – a bed for each household member, use of solid fuels, perceived water quantity and affordability of water – that do have an independent association with bad self-reported health status. For all significant associations, it is important to note that they cannot indicate causal relationships between particular determinants and health outcomes.

An interesting finding of all the regression analyses is that ethnicity provides no significant associations; the same is true of sex. This may indicate that, given the same socioeconomic and environmental circumstances, individuals of different sex and ethnicity show comparable self-reported health outcomes.

As the findings indicate stronger health associations for socioeconomic and demographic determinants, social strategies focusing on, for example, education and employment of disadvantaged population groups could present a promising approach to mitigating health inequalities (as well as environmental inequalities). Targeted

environmental interventions, focusing especially on the supply and affordability of water and on energy use, could also offer a successful approach to reducing the potential health consequences of environment-related problems. The results therefore provide some justification for the inclusion of selected environmental components in social support and poverty-alleviation strategies.

In this context, it should be noted that self-reported health status is a very vague health indicator and thus not an ideal health measure for regression models; it is highly generic and affected by a large number of variables. Environmental dimensions alone, therefore, are unlikely to be strongly associated with variations in self-reported health status, as the results above confirm. More specific and environment-related health outcomes, such as asthma, allergies and respiratory disease, could possibly provide much stronger associations, thus documenting the larger role played by environmental vulnerability. However, many relevant health outcomes that are associated with environmental conditions are not covered by the survey questionnaire, and those that are covered, such as bronchitis and diarrhoea, do not provide sufficient case numbers to run multivariate regression models.

4 Summary and conclusion

This report has provided a wealth of evidence on the scale of environmental inequalities in Obiliq/Obilić and Fushë Kosovë/Kosovo Polje, and on the part played by socioeconomic, demographic, spatial and ethnic determinants in bringing about these inequalities. The large number of variables covering social and environmental conditions and the sample size of more than 9000 individuals provided the basis for detailed analysis that allowed environmental inequalities to be quantified and the most vulnerable population groups to be identified for future action. However, given the limitations of the data, more detailed work is still needed:

- to confirm the magnitude and potential health consequences of the social and environmental vulnerability presented in this report;
- to assess whether the findings are indicative of environmental vulnerability throughout Kosovo.[24]

4.1 Summary

This summary section highlights some of the key findings on the priorities, determinants and health implications of environmental inequalities.

4.1.1 Priorities of environmental risk and disadvantage

The proportion of the total sample population affected by a given environmental disadvantage is highly variable and can range from less than 5% to 50%, depending on the environmental variable concerned. A low level of exposure to an environmental disadvantage does not mean that it is acceptable, and in total numbers it may still affect a significant number of people. For example, 3.2% of dwellings lack electricity; this affects around 300 individuals within the survey sample but around 3000 residents of Obiliq/Obilić and Fushë Kosovë/Kosovo Polje. Assessment of environmental disadvantage and vulnerability should not, therefore, be based exclusively on the percentage of the population reporting a certain disadvantage; it should also reflect the severity and impact of the disadvantage concerned.

While some issues affect only a small part of the sample population, others affect much or even most of the population. Such key priorities relate to:

- perceived inadequacy of quality (49.9%) and quantity (23.3%) of water supply;
- lack of access to piped water within the dwelling (47.0%);
- basic services such as water (47.6%) and energy (55.9%) being unaffordable;
- use of solid fuels (wood and coal) as the main energy source for heating (79.3%) and cooking (70.4%);
- perceived air pollution (60.7%) and environmental contamination with toxic substances (50.5%) in the locality.

[24] All references to Kosovo should be understood in the context of UN Security Council resolution 1244 (1999).

The high prevalence of a particular environmental disadvantage in the population as a whole does not mean that specific population groups, or residents living in certain areas, may not be especially badly affected by it.

Striking environmental inequalities are most often found when a particular environmental disadvantage is less common within the population as a whole. Examples of environmental disadvantages that are especially concentrated within specific population groups include:

- dilapidated housing conditions in households with financial problems (22.6%, compared to 8.5% in the total population);
- inadequate sanitary amenities in RAE households (24.2%) and households with low education (25.2%, compared to 8% in the total population);
- severe crowding in poor households with many members (51%, compared to 6% in the total population);
- non-piped water from wells in rural areas of Fushë Kosovë/Kosovo Polje (31.3%, compared to 12.2% in the total population).

These findings show that, for particular population groups or localities, specific environmental issues may be important that are not necessarily identified as priority issues for the sample as a whole.

4.1.2 Environmental inequalities and their main determinants

Inequalities in exposure to environmental and social disadvantages are found for all variables related to housing, water/hygiene/sanitation, environmental exposure and affordability. In essence, there are three key points on the magnitude of environmental inequalities.

- The greatest inequalities in environmental disadvantage are to be found in relation to socio-economic determinants (especially income and education) and ethnicity.
- Environmental inequalities are also to be found in relation to spatial determinants (municipality and urban–rural residence).
- Combining the impact of socioeconomic, demographic, ethnic and spatial determinants creates “multiple disadvantage”, which strongly increases environmental inequalities.

In the sections below, a summary is provided for each of these three key points.

The greatest inequalities in environmental disadvantage

Very great inequalities in environmental and infrastructural conditions are found especially in relation to housing equipment for hygiene, sanitation, cooking and heating. Often such problems do not affect large parts of the population, but they can be a major concern for specific ethnic or socioeconomic population subgroups and may lead to high relative inequalities. For example, lack of electricity supply in the dwelling is reported by only 0.1% of individuals with university education but by 10% of individuals with no education, giving an inequality ratio of 100; lack of a bathroom in the dwelling is reported by only 0.3% of Albanian households but by 20.2% of RAE households, giving an inequality ratio of 68.

Across all variables of environmental disadvantage, the clearest inequalities are most often to be found in relation to:

- ethnicity: associated with socioeconomic variables such as education, income and employment, with RAE generally being the most disadvantaged ethnic group;
- income: a socioeconomic determinant representing financial capacity/purchasing power, with individuals in the lowest income quintile being most disadvantaged;
- education: a socioeconomic determinant representing social status and closely associated with income, with individuals reporting no education being the most disadvantaged group.

Spatial inequalities in environmental disadvantage

Environmental conditions can differ markedly between urban and rural areas, between municipalities (Obiliq/Obilić and Fushë Kosovë/Kosovo Polje), and between different neighbourhoods and settlement areas. However, there is no general conclusion about which spatial setting is most disadvantaged, as this largely depends on the particular environmental disadvantage under consideration. Generally, environmental inequalities associated with spatial determinants tend to be less strong than environmental inequalities associated with socioeconomic or ethnic determinants. The most relevant spatial inequalities related to urban–rural location or municipality are:

- use of coal or wood for cooking or heating (83.3% in rural areas, compared to 40.8% in urban areas);
- perception of air quality as very bad (42.5% in Obiliq/Obilić, compared to 23% in Fushë Kosovë/Kosovo Polje);
- perception of toxic contamination as very bad in Fushë Kosovë/Kosovo Polje (39.3% in rural areas, compared to 20.6% in urban areas);
- no access to piped water in dwelling (21.7% in rural areas, compared to 7.3% in urban areas);
- perception of water quality as inadequate (68.4% in urban areas, compared to 41.4% in rural areas);
- perception of water quantity as inadequate (27.6% in rural areas, compared to 11.5% in urban areas).

Inequalities in reported environmental conditions can be extreme at the local and neighbourhood level. Pollution hot spots, in particular, have been identified in settlement areas located close to major contamination sources such as the KEK power plant, where residents report much more serious environmental pollution.

- Perception of poisonous and toxic substances in the neighbourhood as “very bad” increased from 23% (all other settlements) to 68% (settlements surrounding the KEK plant).
- Perception of water quality in the neighbourhood as “very bad” increased from 17% (all other settlements) to 60% (settlements surrounding the KEK plant).

Neighbourhood-specific environmental inequalities are not captured by more general types of analysis and therefore remain invisible unless detailed small-scale analysis is done.

Inequalities associated with multiple disadvantage

Ethnicity, income and education are associated with the greatest environmental inequalities. However, in reality, disadvantage tends to be clustered, and vulnerable population groups are usually affected by various socioeconomic, demographic or other challenges simultaneously.

Table 29 shows the variation in environmental vulnerability in situations of multiple disadvantage, presenting the data in two scenarios: a poverty scenario, which focuses on low income and financial problems; and a limited-asset scenario, which focuses on lack of education and employment (the data are presented in greater detail in Annex 4). Multiple disadvantage strongly increases the environmental vulnerability of the relevant population group for each of the four areas of environmental disadvantage covered (housing services, water/hygiene/sanitation, environmental exposure and affordability).

The results demonstrate that the highest levels of vulnerability are related to multiple disadvantage and that the population groups in most need of interventions are to be identified by such measures of multiple deprivation. In addition, the results show that "multiple disadvantage" is not exclusively associated with urban and rural residence.

Table 29. Increase in inadequate cluster scores in relation to multiple disadvantage

	Population with inadequate WHS score (%)	**Population with inadequate HS score (%)**	**Population with inadequate EE score (%)**	**Population with inadequate AF score (%)**
Reference (total sample)	**7.4**	**11.6**	**26.3**	**26.6**
Poverty scenario	Rural, RAE, low income, severe financial situation: **43.3**	Rural, RAE, low income, large household: **82.0**	Urban, RAE, low income, large household: **69.4**	Urban, RAE, low income, severe financial situation: **83.9**
Limited-asset scenario	Urban, RAE, unemployed, no education: **48.8**	Rural, RAE, unemployed, no education: **87.9**	Rural, RAE, unemployed, no education: **84.4**	Urban, RAE, unemployed, no education: **72.7**

However, the analysis also indicates that, for population groups affected by multiple disadvantage, interventions that target only one of the disadvantages concerned, such as employment, may still be effective in reducing environmental vulnerability.

4.1.3 Health impacts of social and environmental conditions

Individuals suffering from disease are more likely also to be exposed to inadequate environmental conditions; this is valid for all four clusters (HS, WHS, EE and AF). These findings suggest that a growing environmental burden and increased reporting of selected diseases are connected, but this does not necessarily mean that they are causally connected. Rather, expressions of environmental vulnerability may be an indication of general disadvantage, which in turn is associated with higher reporting of diseases. However, because of the small

number of cases involved and the unknown influence of (for example) age, the results are not conclusive, though they provide useful hypotheses to be tested in future work.

Environmental inequalities are also associated with a rise in the proportion of the population with bad self-reported health status, especially with respect to inadequate housing and affordability conditions. Almost a quarter (23.2%) of the population with bad self-reported health status indicate that they are highly vulnerable to environmental and social problems in general (compared to 14% in the total population). Although the results cannot prove that inadequate environmental conditions affect health directly, they do show that individuals in bad health conditions are challenged by the highest level of general vulnerability more often than individuals in good health. However, self-reported health status is a general health outcome affected by a wide variety of factors; it does not, therefore, provide an accurate health assessment for environmental determinants and thus may lead to an underestimation of the health impacts of environmental inequality.

The interplay of social and environmental vulnerability in relation to self-reported health status is elucidated by logistic regression models, generating four key findings.

- Socioeconomic and demographic variables are associated with a very marked increase in bad self-reported health status, especially in relation to age and lack of education but also in relation to rural residence and financial problems.
- Only a few specific environmental disadvantage parameters (use of solid fuels, perception of water quantity as inadequate, water affordability problems, not having a bed for each household member) are associated with an independent increase in bad self-reported health status when the influence of socioeconomic, demographic, spatial and ethnic variables are taken into account.
- Generic indicators of environmental vulnerability as defined by the HS, WHS and EE cluster scores are not associated with an increase in bad self-reported health status when the influence of socioeconomic, demographic, spatial and ethnic variables is taken into account.
- Inadequate affordability is associated with an increase in bad self-reported health status; this impact is reduced by socioeconomic, demographic, spatial and ethnic variables but remains statistically significant.

Overall, environmental determinants have much weaker associations with self-reported health status than socioeconomic and demographic determinants, but some of the environmental disadvantage parameters still show a significant and independent association. Affordability with respect to basic services (food, water, energy, etc.) shows a stronger association, possibly because the AF score is oriented more towards socioeconomic status than environmental aspects. The strongest association with self-reported health status is found for age and education, while ethnicity – one of the major determinants of environmental inequalities – does not appear to be significantly associated with variations in self-reported health status at all. This is not surprising as, from a health perspective, ethnicity may have little relevance to health status when full account is taken of all other determinants, including age, sex, income and education.

4.2 Conclusion and possible interventions

The following conclusions can be drawn for policy-makers in the fields of social protection, environmental management and public health.

- Socioeconomic and demographic determinants and ethnicity have a strong impact on differences in environmental exposure between population subgroups. The data, therefore, provide strong evidence of the presence of environmental inequalities. For the assessment of inequities, a value judgment is necessary.[25] It is likely that many of the inequalities identified may also qualify as inequities.
- Income, ethnicity and education have the strongest impact on environmental inequalities. Overall, socioeconomic factors are more relevant in the case of environmental inequalities than demographic ones.
- Spatial determinants such as urban or rural residence, municipality and settlement area further affect the occurrence of environmental inequalities by providing a specific infrastructural context (for example, water supply infrastructure or proximity to contamination sources).
- Socioeconomic and demographic determinants play a major role in differences in self-reported health status; age is the most significant determinant, followed by education, financial problems and urban–rural residence. Ethnicity and sex have no influence on variations in self-reported health status.
- Some reported environmental disadvantage parameters show an independent association with self-reported health status. Perception of water supply and use of solid fuels, in particular, show such an association that is independent of the impact of socioeconomic or demographic influences.
- Overall, environmental determinants show a less strong association with variations in self-reported health status than socioeconomic and demographic determinants. With the exception of the few environmental disadvantages and perceptions mentioned above, variations in environmental conditions do not seem to play a statistically significant role in variations in self-reported health status. This suggests that environmental inequalities may explain only a small proportion of health inequalities.

On the basis of the results presented in this report, the following action steps are suggested to reduce environmental inequalities and related health outcomes.

[25] Inequities represent differences and disparities that are considered avoidable, unjust or unfair. To identify which inequalities actually represent inequities therefore includes a value judgement and depends on the given context.

4.2.1 Interventions with social focus: investing in people and society

• Support for basic education and vocational training

Education has a strong impact on environmental and social inequalities, irrespective of urban–rural differences or ethnic background. A first objective should be to ensure that basic education is provided for all children. A second objective should be to ensure that education is offered free of charge to all population groups and that children do not drop out of school early.

• Employment campaigns and support for low-income and green jobs

Employment also has a strong impact on environmental and social inequalities, irrespective of ethnicity, residential location and educational level. As a first and short-term measure, low-income job opportunities should be created to allow employment and income generation for individuals with low educational levels. Specific emphasis could be given to green jobs supporting sustainable structures. In the medium term, a job market for more skilled professions is needed.

• Social support schemes

Socially vulnerable population groups, such as those lacking employment and living on low incomes, tend to experience more harmful environmental conditions. Social support mechanisms are needed to provide basic social security for vulnerable households that are not able to benefit from employment and education initiatives. Such support schemes should be designed to encompass individuals without full registration and lacking formal papers in order that they gain access to social and health services.

• Integration of marginalized ethnic groups into civil society

RAE ethnicity has been identified as a key determinant of most environmental inequalities. Efforts are needed to better integrate these ethnic groups into civil and public life and to reduce stigmatization. Such an initiative should include political measures and formal procedures to be followed within municipal authorities, including green job opportunities for the RAE population, education, vocational training and social support schemes.

• Active outreach of health system services

Socioeconomic, demographic, spatial and ethnic determinants have been identified as contributors to inequalities in self-reported health. To reach the most vulnerable population groups, the outreach functions of the health system need to be improved to proactively seek out vulnerable and passive population groups that do not currently make adequate use of what the health system has to offer. Child vaccination is a successful example of such approaches, which can be widened to provide programmes dedicated to such areas as maternity care, reproductive health and sexually transmitted diseases. The introduction of special health mediators dealing with RAE-specific health vulnerabilities at the community level should be considered. So long as health care is not universal and accessible to all, unregistered individuals should be allowed to register for health services.

4.2.2 Interventions with environmental focus: investing in infrastructure and environmental protection

• Universal action on environmental priority problems

Many environmental problems may be more common in disadvantaged population groups but also affect a large part of the total population. For these environmental disadvantages, universal actions are needed to improve conditions for the benefit of the whole population. Measures to be explored might include strict environmental regulations on emissions and waste management and the introduction of risk-based management approaches in public water supply and sanitation services. For any action taken, it is necessary to ensure that the interventions create equal benefits for all population groups and reduce existing inequalities.

• Targeted action on environmental inequalities

Specific environmental disadvantages are distributed unequally and especially affect certain population subgroups, so targeted action is required to improve the environmental conditions of the relevant groups. Examples could include support for large households in finding adequate social housing with sufficient rooms, and environmental management and protection schemes targeting hot spots where highly vulnerable population groups are exposed to sharply increased levels of environmental disadvantage. Such interventions could include provision of environmentally friendly cooking equipment and adequate sanitary facilities.

• Rural development programmes

Various environmental inequalities are mainly found in rural areas and are attributable in part to a lower quality of infrastructure, such as sanitary amenities and energy supply. For these specific areas of rural disadvantage, infrastructural measures to improve service and quality standards, among other things, are needed.

• Urban planning and environmental management

Urban areas often have a specific environmental burden related to pollution, informal settlements, and restrictive housing markets that do not provide adequate housing for low-income households. These specific urban issues must be identified and tackled through urban regeneration, environmentally friendly urban planning and environmental protection measures, improving urban conditions for everybody but with a focus on the most deprived city areas.

• Focus on environmental features with the highest health relevance

To maximize the health benefits of policies and interventions, environmental action may focus in particular on environmental priorities with a direct impact on health. Issues related to water safety, including both affordability and quality and quantity of water supply, and reduction of solid fuel use at home should be central objectives of environmental health protection interventions.

4.2.3 Linking social and environmental interventions

In order to achieve the best results, it is essential that environmental interventions on behalf of vulnerable population groups go hand in hand with social interventions. For the most part these should be in the areas of employment and education.

Annex 1. Database cleaning, validation and preparation steps

Database structural changes

The original database comprised 2042 cases representing 2042 interviewed households in total. Since the questionnaire contained several questions to which all family members had to answer separately, the original database contained 10 variables for each of these questions, representing the responses from up to 10 individual family members. Questions with the same response for every household member (for example, household income and housing location) were filled with the same answer for each household member, while for person-specific data (age, education and health status) each person provided a different answer. This database structure severely restricted all analyses using person-specific data, as these had to be done separately for the first person, the second person, the third person (and so on) of each household.

As each of the 2042 surveyed households included 10 variables for each personal feature such as age, sex and education (allowing for a maximum of up to 10 household members), the database contained information for a theoretical total of 20 420 individuals. However, many households had fewer household members and the valid total number of surveyed individuals was therefore very difficult to identify in the original database.

To allow for analysis at the level of individual person, the original database was restructured to provide the data for each individual as a single case, resulting in a total sample database of 20 420 cases. The original database was kept as a household-level database after deletion of all data for individuals 2 to 10; thus the household-level database contains only one set of data for each household (housing information plus individual data for person 1, representing the household head).

Deletion of cases and data

The new database comprised a total of 20 420 cases, as for each of the 2042 surveyed households 10 cases were automatically produced, allowing for a possible maximum of 10 household members. Since the actual number of household members varied between 1 and 10, all cases representing non-existent household members were deleted.

In the course of further database cleaning, 21 households were identified that had been entered in the database more than once. As it proved impossible to ascertain which of the entries was the correct one, these households and individuals were deleted completely so that the reliability of the data was not affected.

Invalid data, such as an age of 234 years and a dwelling with 56 rooms, were deleted when they could not be corrected.

Modification of variables

For a first overview of the scope and distribution of the data and to identify unexpected values, frequency analyses were performed to validate the database. Several modifications were made to correct obvious data-entry mistakes, invalid data and other inconsistencies. The value “7777”, which was inserted to represent missing values, and values representing refused answers or “Don’t know” answers were marked as missing values for every evaluated variable in order to obtain an overview of valid answers only.

In addition, several variables were recoded as new variables in both databases. Examples of such variable modification are listed below.

- Variables with continuous values, such as age, income and missed days of work, were recoded in percentile groups to allow for manageable analysis, while for other variables selected answer categories were merged or sorted into broader categories. Examples of such recoding are ethnicity, where Roma, Ashkali and Egyptian ethnicities were merged as "RAE", and educational categories, which were reduced from 11 highly detailed categories to five more generic ones.
- Self-reported health status was recoded as two variables: a health variable with three answer options instead of five ("very good" and "good" were merged as one category, "bad" and "very bad" as another category, and "moderate" was left as the middle option); and a dichotomized variable ("good/very good" was opposed to "bad/very bad", and the middle option "moderate" was defined as a missing value).

The recoding of variables helped to make the data set more manageable for analysis, and in particular increased case numbers within each category to allow for multivariate analyses.

Creation of new variables

New variables were created to allow better exploitation of the database and to make full use of the data collected. The new variables were based on existing variables but were intended to create an added value in relation to the relevance or interpretation of data. Examples of such new variables are listed below.

- Data on the age of all household members were used to generate the variable "Household_ with_children_under_18", which indicates the presence of children under the age of 18 in a given household.
- Based on information on problems affording food, water or energy, a variable was produced to merge the three separate variables into one, indicating whether a certain household reported none, one, two or all three of these affordability problems.
- The total number of household members was combined with the number of rooms available to produce a continuous residential density variable, which was then categorized into crowding levels.

Annex 2. Sample description (selected socioeconomic, demographic, spatial and ethnic variables)

Total sample (n = 9495)				Distribution by municipality		Obiliq/ Obilić	Fushë K./ K. Polje
Variable	**Variable category**	**%**		**Sample size**	**Variable category**	**%**	**%**
Municipality	Obiliq/Obilić	45.8					
Valid = 9358	Fushë Kosovë/Kosovo Polje	54.2					
Missing = 137	Total	100.0					
Sex	Male	51.7		Valid = 9140	Male	51.0	52.1
Valid = 9271	Female	48.3		Missing = 355	Female	49.0	47.9
Missing = 224	Total	100.0			Total	100.0	100.0
Age group quintiles	0–10	20.2		Valid = 9189	0–10	19.5	20.6
Valid = 9325	11–20	20.3		Missing = 306	11–20	21.8	19.1
Missing = 170	21–31	19.7			21–31	19.7	19.8
	32–46	19.9			32–46	19.5	20.1
For analysis, three age groups (0–14, 15–64, 65+) were established.	47 and older	19.9			47 and older	19.5	20.3
	Total	100.0			Total	100.0	100.0
Ethnicity	Roma [a]	12.5		Valid = 9089	Roma [a]	21.5	4.2
Valid = 9226	Albanian	61.2		Missing = 406	Albanian	68.9	55.7
Missing = 269	Bosnian	0.1			Bosnian	0.1	0.1
	Ashkali [a]	17.6			Ashkali [a]	3.7	29.1
[a] Roma, Ashkali and Egyptian were grouped together as "RAE".	Egyptian [a]	1.8			Egyptian [a]	0.3	3.0
	Serbian	6.8			Serbian	5.6	7.9
	Total	100.0			Total	100.0	100.0
Household members	1	0.5		Valid = 9358	1	0.3	0.6
Valid = 9495	2	4.0		Missing = 137	2	2.5	5.3
Missing = 0	3	8.4			3	7.8	9.0
	4	19.0			4	16.5	21.6
The variable was then	5	21.7			5	21.4	21.6
categorized as	6	18.6			6	19.0	18.1
household size:	7	12.7			7	14.7	11.3
1–3 individuals	8	6.7			8	7.5	6.2
4–6 individuals	9	4.6			9	5.7	3.5
7 and more individuals.	10	3.7			10	4.7	2.8
	Total	100.0			Total	100.0	100.0

Annex 2. Sample description (selected socioeconomic, demographic, spatial and ethnic variables)

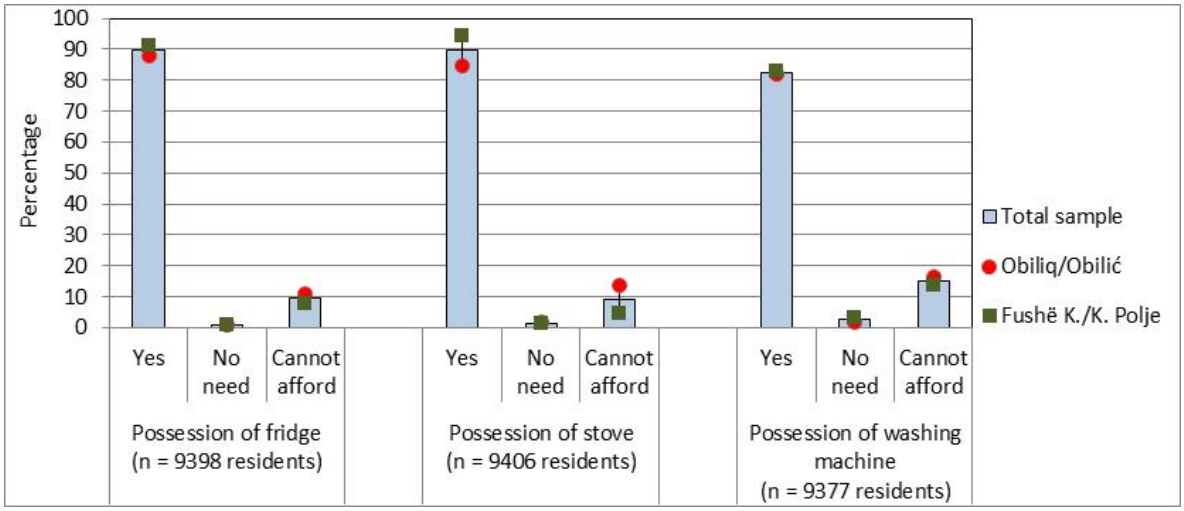
Total sample (n = 9495)				Distribution by municipality		Obiliq/ Obilić	Fushë K./ K. Polje
Variable	**Variable category**	**%**		**Sample size**	**Variable category**	**%**	**%**
Literacy	Too young for literacy	15.0		Valid = 8764	Too young for literacy	13.7	15.9
Valid = 8892	Yes	78.2		Missing = 731	Yes	81.1	76.1
Missing = 603	No	6.8			No	5.2	8.0
	Total	100.0			Total	100.0	100.0
Current job status	Works full-time	14.4		Valid = 6065	Works full-time	12.0	16.4
Valid = 6143	Works part-time	1.8		Missing = 3430	Works part-time	1.1	2.5
Missing = 3352	On and off work	1.6			On and off work	1.5	1.7
	On vacation/ill	0.1			On vacation/ill	0.1	0.1
	Seasonal work	1.4			Seasonal work	1.5	1.4
	No job	55.4			No job	56.6	54.2
	Not of working age (< 15 or retired)	25.4			Not of working age (< 15 or retired)	27.2	23.7
	Total	100.0			Total	100.0	100.0
Employment status	Unemployed	30.0		Valid = 7448	Unemployed	28.3	31.2
Valid = 7546	Housewife/similar function	16.2		Missing = 2047	Housewife/similar function	16.3	16.2
Missing = 1949	Student or in training	26.1			Student or in training	27.5	25.1
	Retired	6.1			Retired	6.3	5.9
The variable was then	Employee, self-employed	19.3			Employee, self-employed	19.3	19.2
categorized into:	Employed, on birth leave	1.0			Employed, on birth leave	0.8	1.1
Employed	Employed in family farm/business	0.7			Employed in family farm/business	0.8	0.5
Unemployed	None due to long-term illness	0.6			None due to long-term illness	0.6	0.7
Other.	Total	100.0			Total	100.0	100.0
Obtained certificate	None (elementary level unfinished)	10.5		Valid = 7856	None (elementary level unfinished)	8.7	11.8
Valid = 7976	Primary level (1–4)	12.0		Missing = 1639	Primary level (1–4)	11.4	12.7
Missing = 1519	Upper elementary level unfinished	1.3			Upper elementary level unfinished	1.7	0.8
	Upper elementary level (5–8)	25.1			Upper elementary level (5–8)	26.7	23.7
The variable was then	Secondary school unfinished	3.9			Secondary school unfinished	3.2	4.6
categorized into four	Vocational/professional school	21.2			Vocational/professional school	22.6	20.2
groups:	Gymnasium (high school)	10.3			Gymnasium (high school)	12.3	8.6
No education (0 yrs)	Associate (two years)	2.1			Associate (two years)	2.1	2.0
Basic educ. (<= 8 yrs)	Unfinished university	4.8			Unfinished university	4.4	5.1
Secondary educ. (> 8 yrs)	University and postgraduate	8.7			University and postgraduate	6.7	10.5
University.	Total	100.0			Total	100.0	100.0

Total sample (n = 9495)				Distribution by municipality		Obiliq/ Obilić	Fushë K./ K. Polje
Variable	**Variable category**	**%**		**Sample size**	**Variable category**	**%**	**%**
Household income quintile [b]	0–100	20.9		Valid = 7056	0–100	16.1	25.2
Valid = 7142	101–220	19.1		Missing = 2439	101–220	20.1	18.2
Missing = 2353	221–350	22.6			221–350	26.3	19.6
	351–500	19.0			351–500	20.3	17.7
[b] Income for last month	501 and over	18.4			501 and over	17.2	19.4
	Total	100.0			Total	100.0	100.0
Financial situation of household	No relevant financial problems	36.2		Valid = 9134	No relevant financial problems	34.9	37.5
Valid = 9266	Some difficulties	35.9		Missing = 361	Some difficulties	34.8	36.9
Missing = 229	Severe impact on household & life	27.9			Severe impact on household & life	30.3	25.6
	Total	100.0			Total	100.0	100.0
Residential location	Capital city	0.2		Valid = 9242	Capital city	0.0	0.3
Valid = 9357	Regional centre	3.2		Missing = 253	Regional centre	3.4	3.1
Missing = 138	Urban	32.1			Urban	16.1	45.6
	Rural	58.1			Rural	80.4	39.8
Most used options were "urban" and "rural".	Unregulated region	6.4			Unregulated region	0.1	11.2
	Total	100.0			Total	100.0	100.0

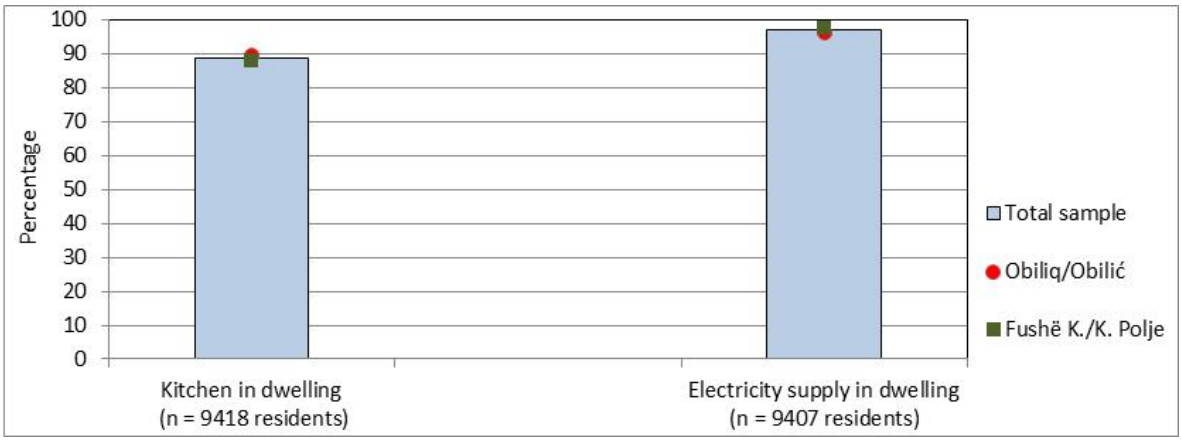
Annex 3. Frequency distributions of key variables by cluster

HS cluster variables

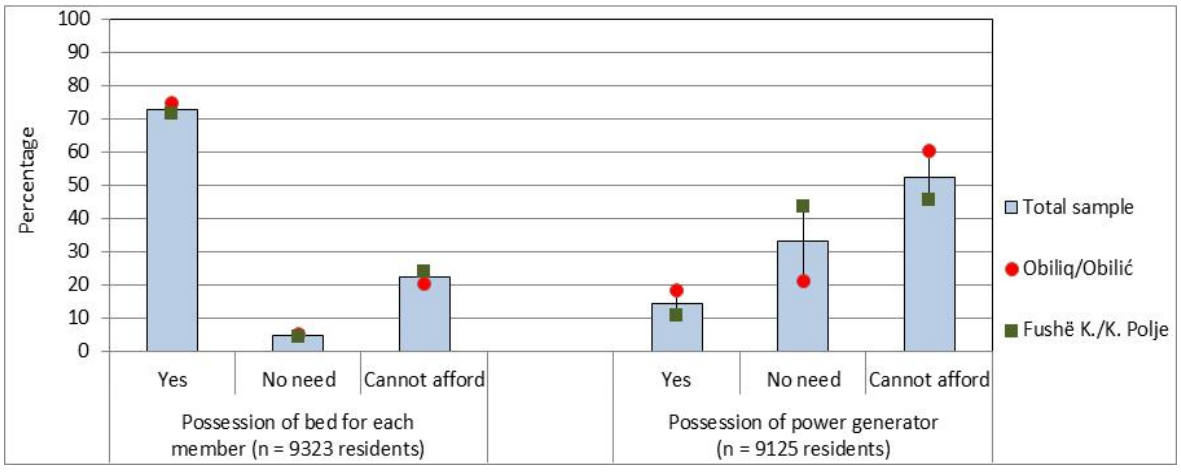
Possession of household items



Possession of kitchen and connection to electricity supply

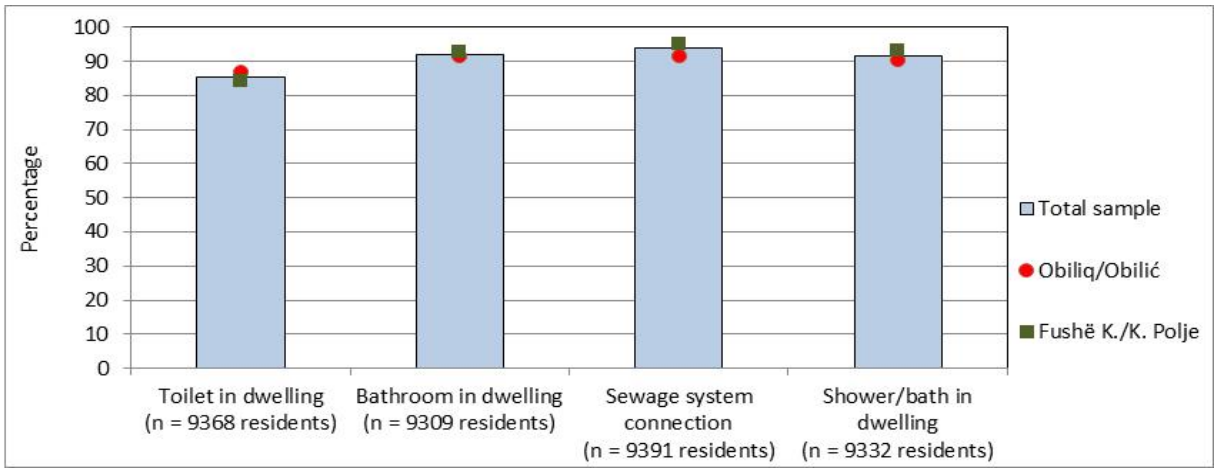


Possession of bed for each household member and of power generator

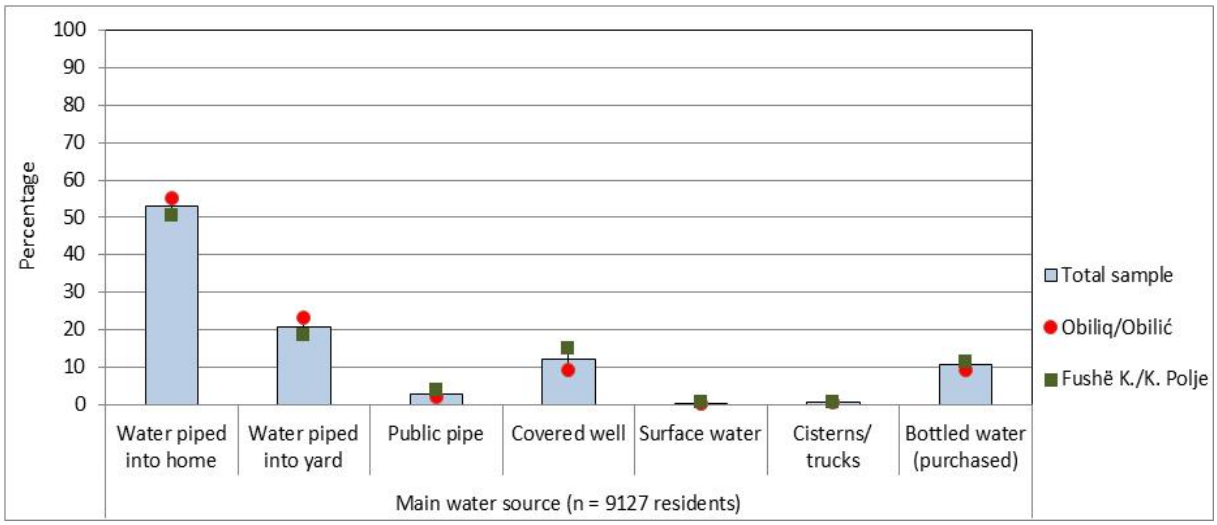


WHS cluster variables

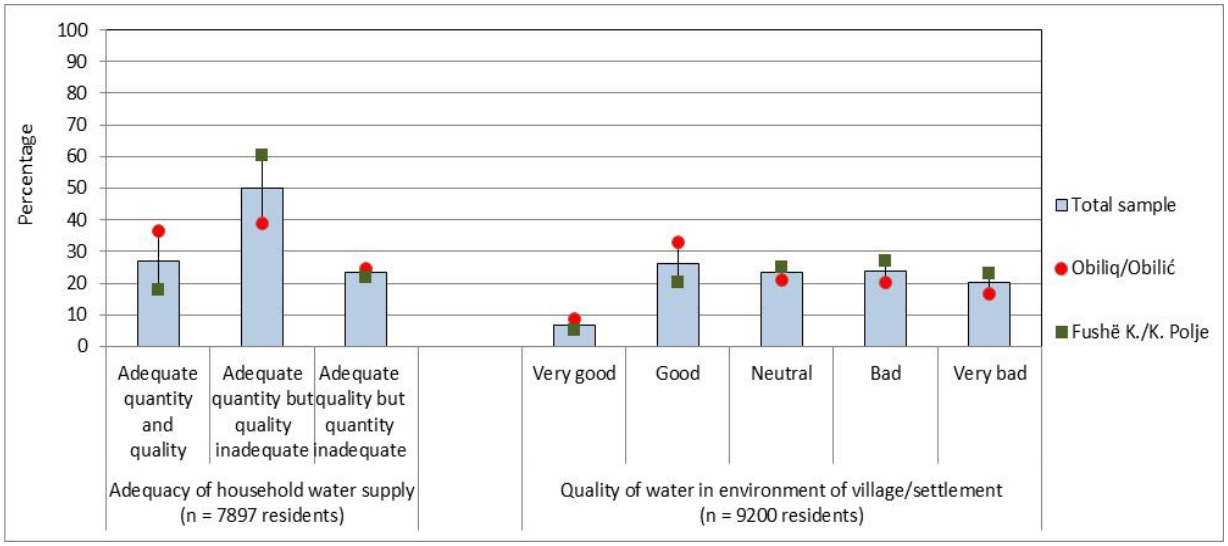
Access to hygiene-related amenities



Principal means of access to water



Assessment of quality and quantity of water supply

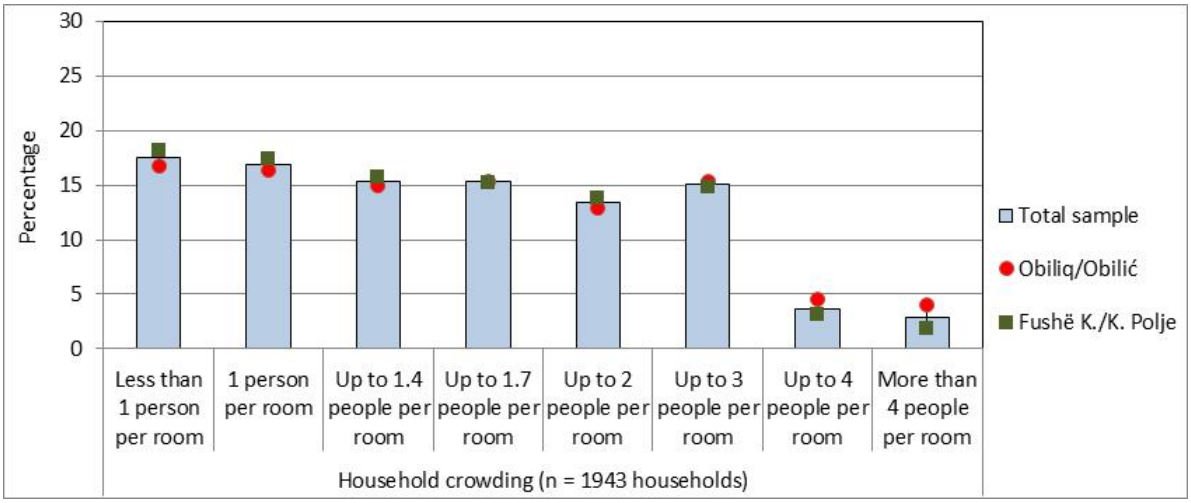


Annex 3. Frequency distributions of key variables by cluster

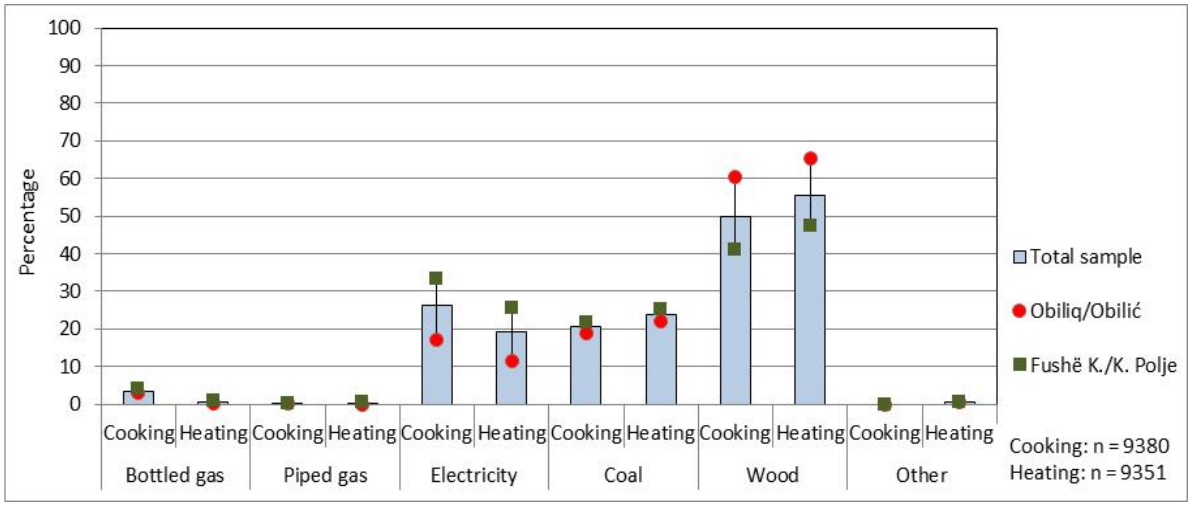
EE cluster variables

Type and condition of accommodation

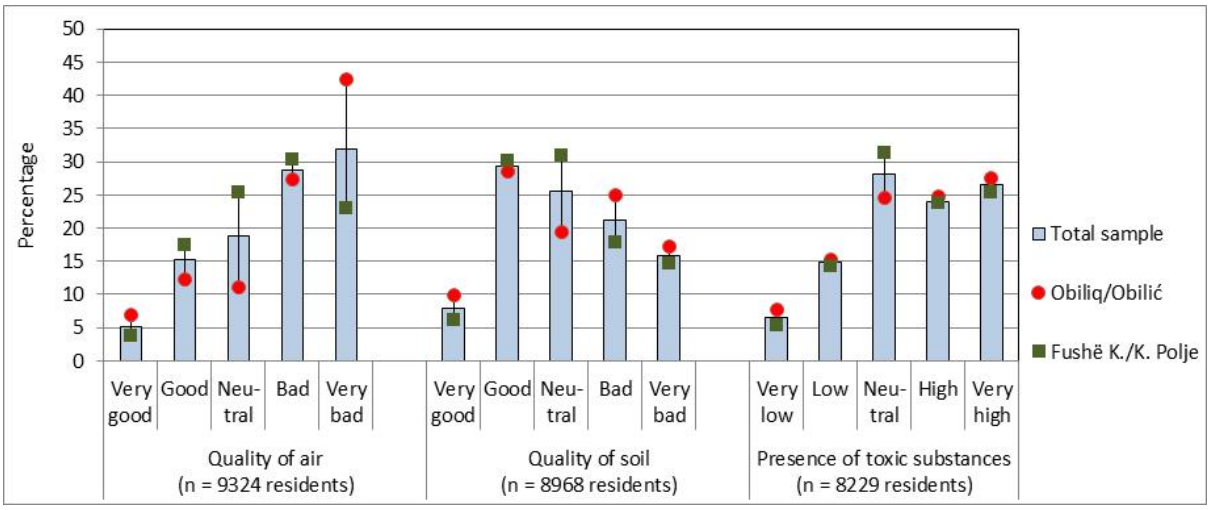
Household crowding (density of occupation)



Type of fuel used for cooking and heating

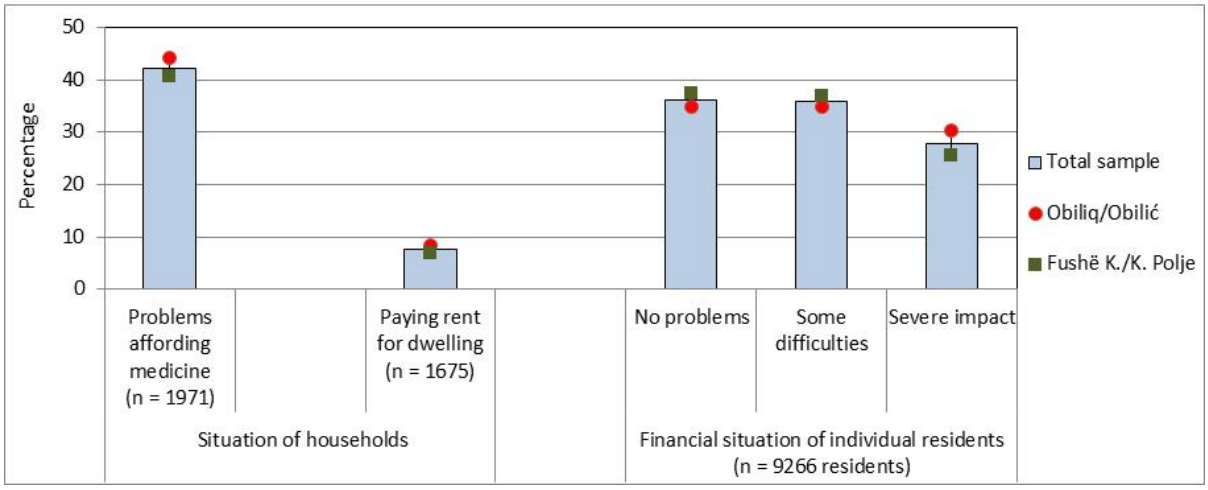


Assessment of air and soil quality, and perceived presence of toxic substances

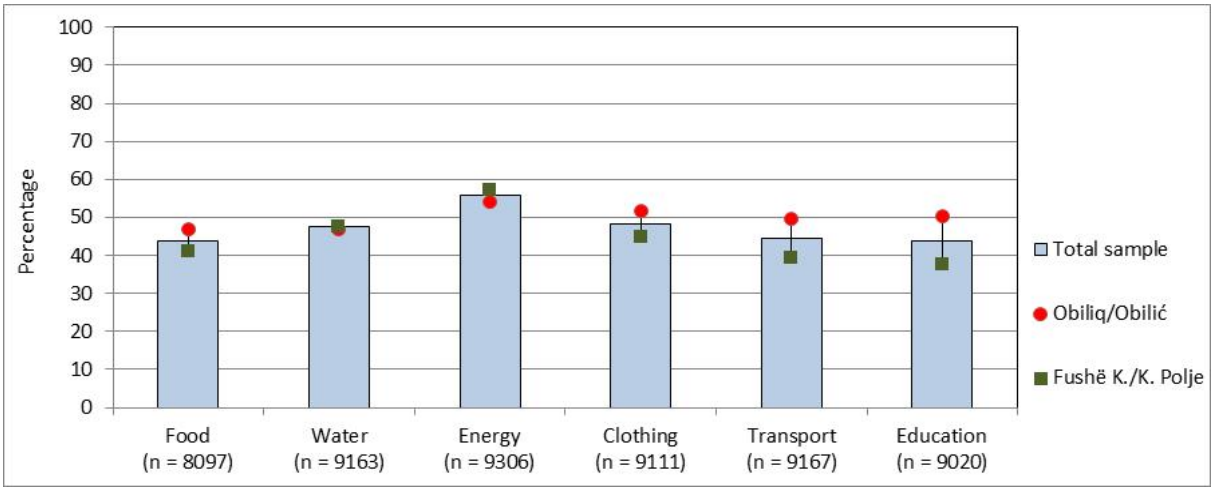


AF cluster variables

Affordability situation for households and individuals

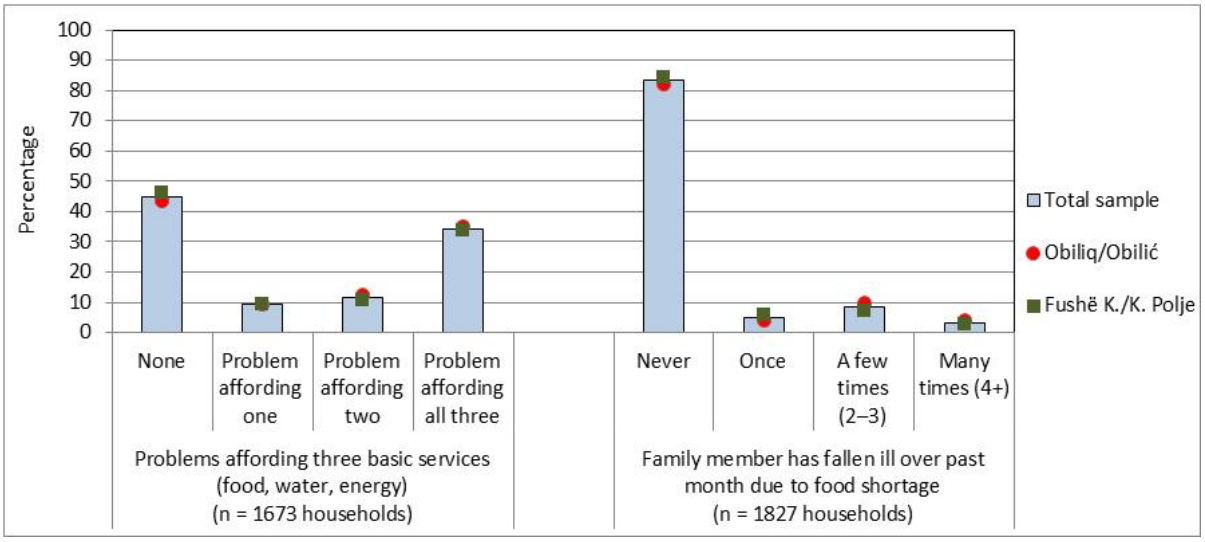


Affordability problems for individuals with respect to basic resources

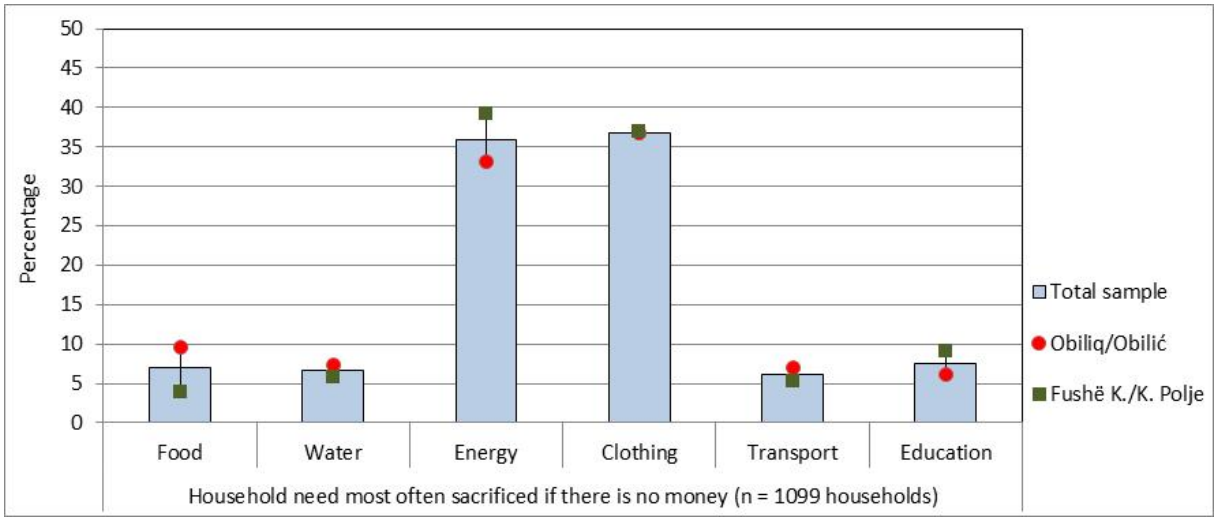


Annex 3. Frequency distributions of key variables by cluster

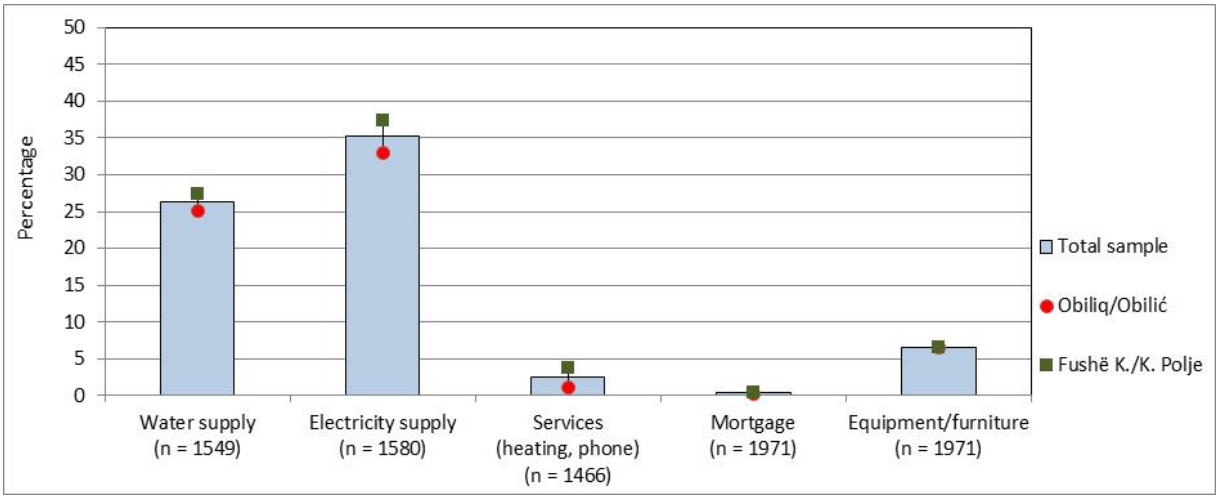
Affordability of basic goods and services and effect of food supply on health



Household need most often sacrificed



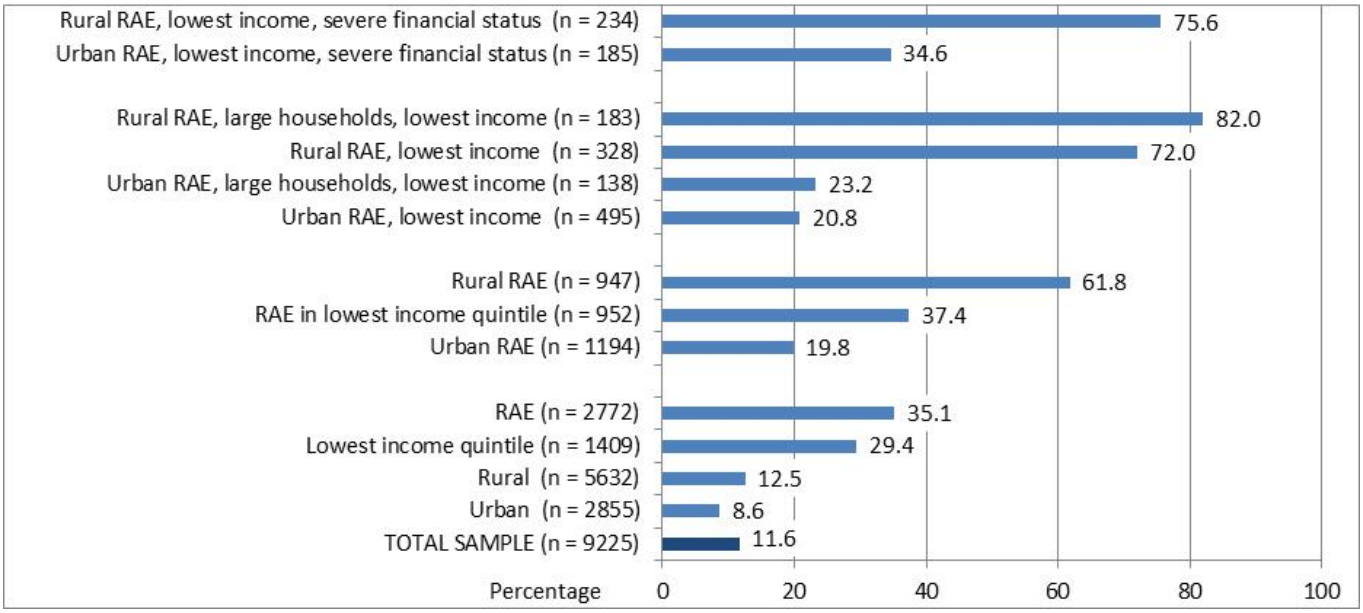
Households reporting debts for housing services and equipment



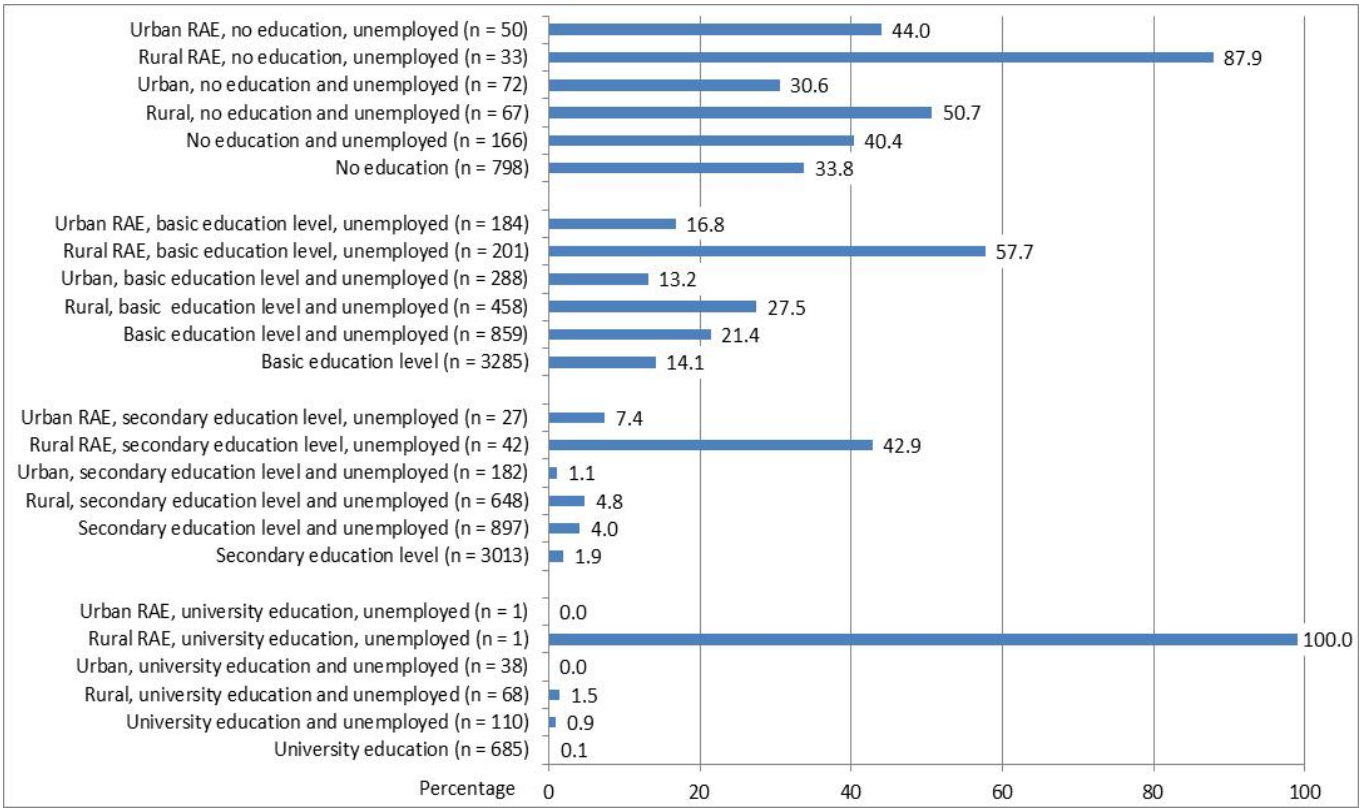
Annex 4. Multiple disadvantage scenarios

Housing services, poverty and limited-asset scenarios

Inadequate housing conditions for population groups with multiple disadvantage (poverty scenario)

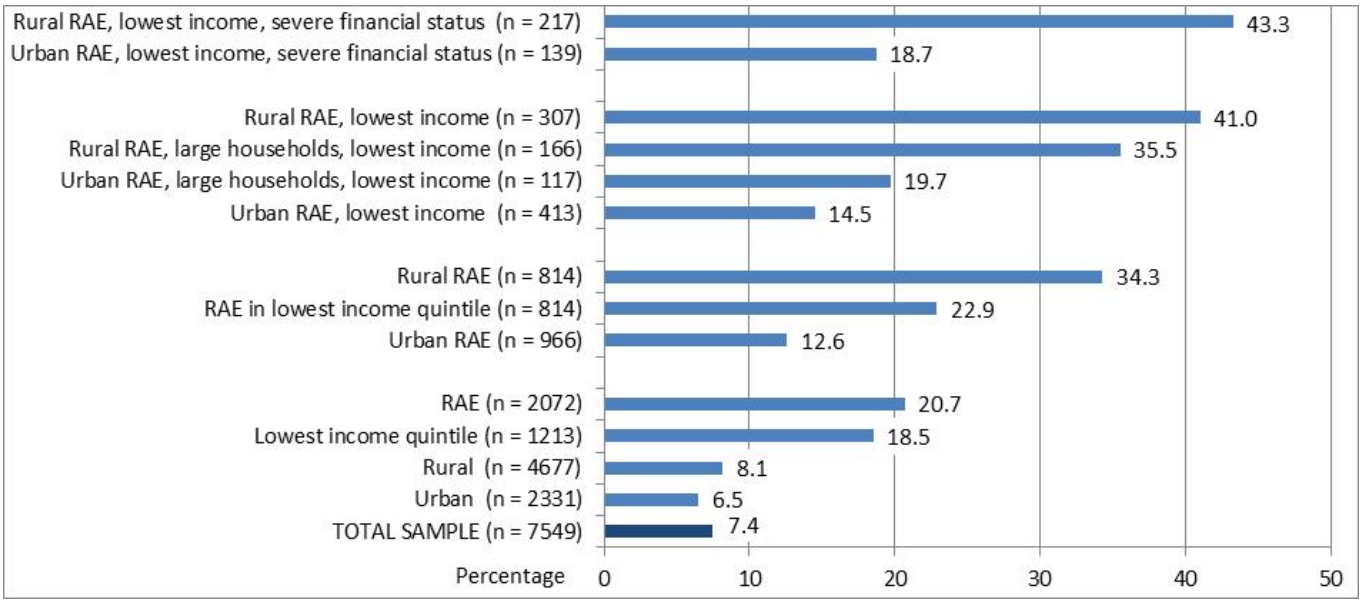


Inadequate housing conditions for population groups with multiple disadvantage (limited-asset scenario)

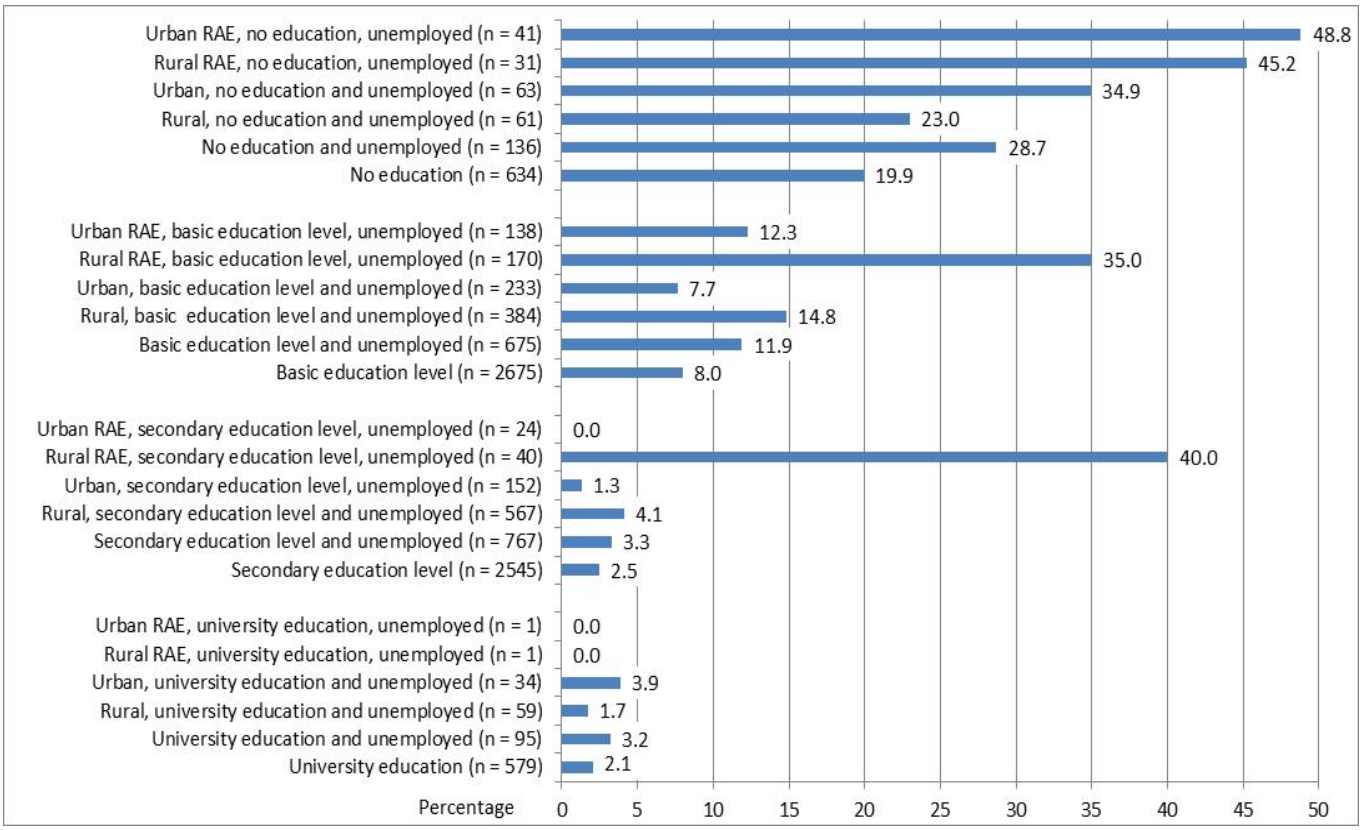


Water/hygiene/sanitation, poverty and limited-asset scenarios

Inadequate water/hygiene/sanitation conditions for population groups with multiple disadvantage (poverty scenario)

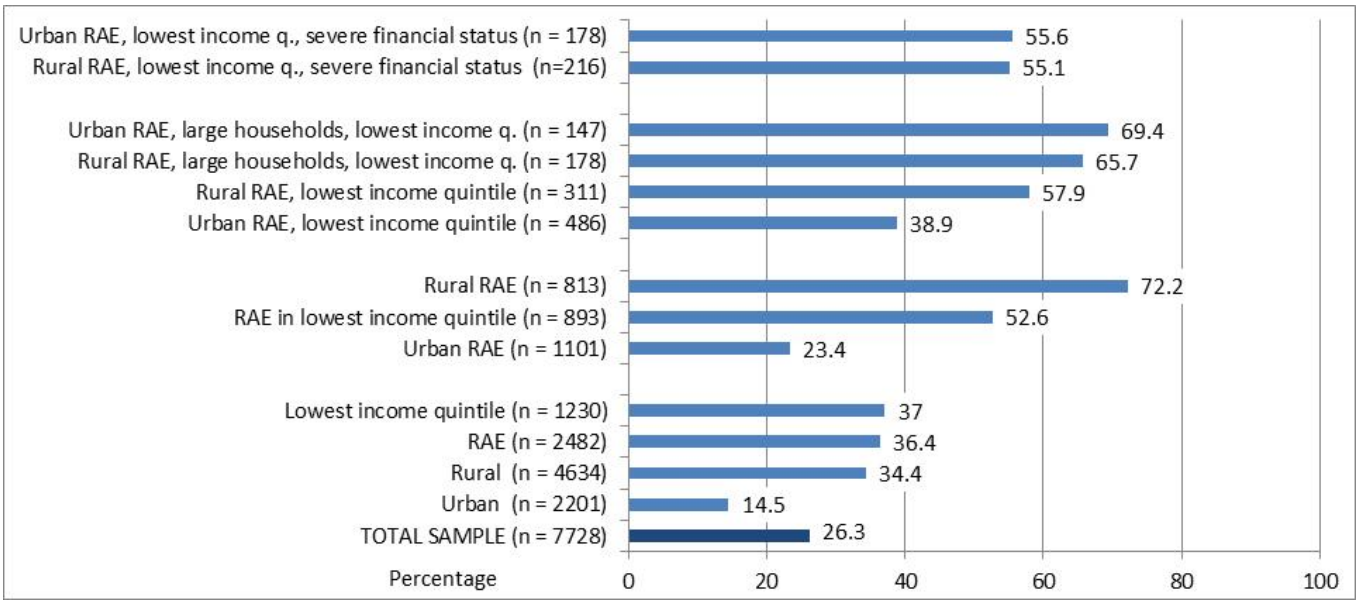


Inadequate water/hygiene/sanitation conditions for population groups with multiple disadvantage (limited-asset scenario)

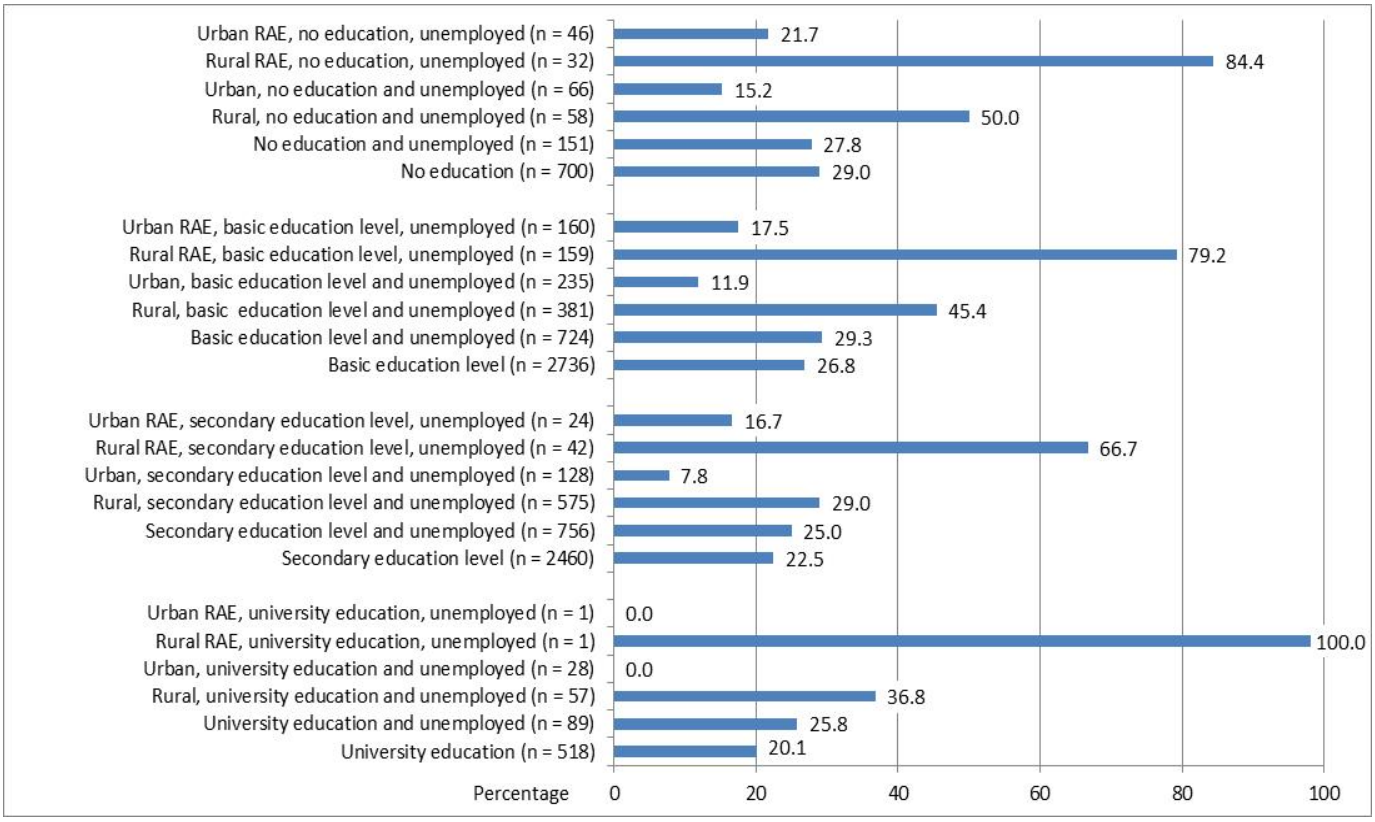


Environmental exposure, poverty and limited-asset scenarios

Inadequate environmental exposure conditions for population groups with multiple disadvantage (poverty scenario)

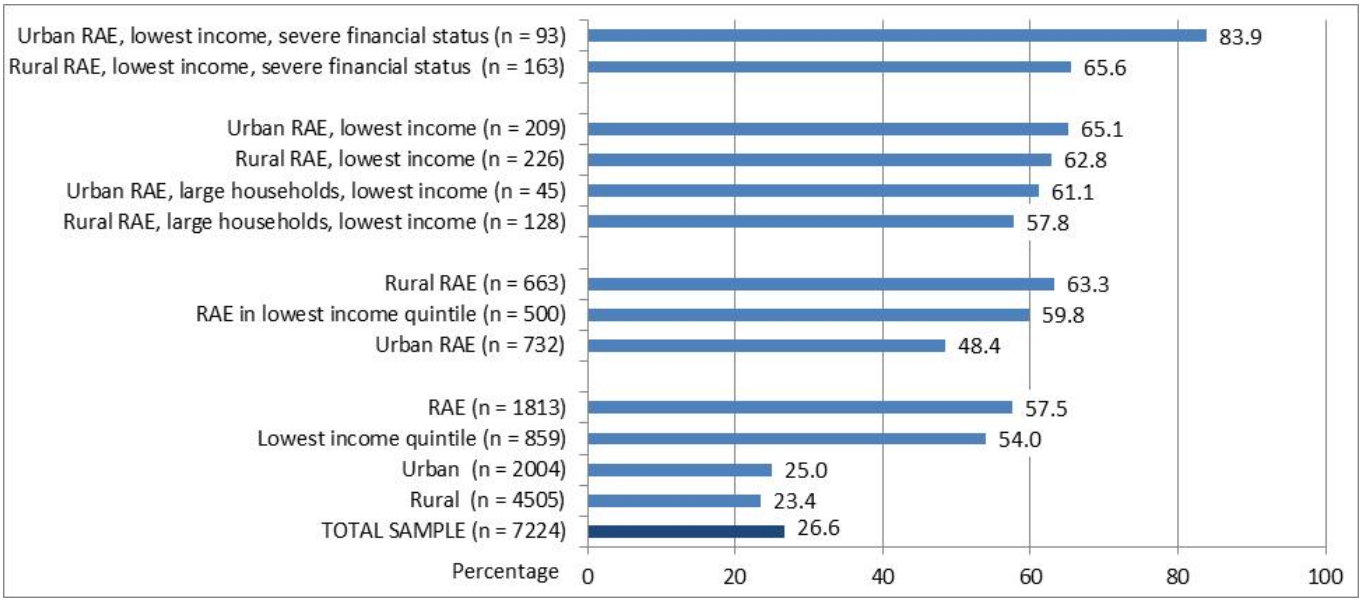


Inadequate environmental exposure conditions for population groups with multiple disadvantage (limited-asset scenario)

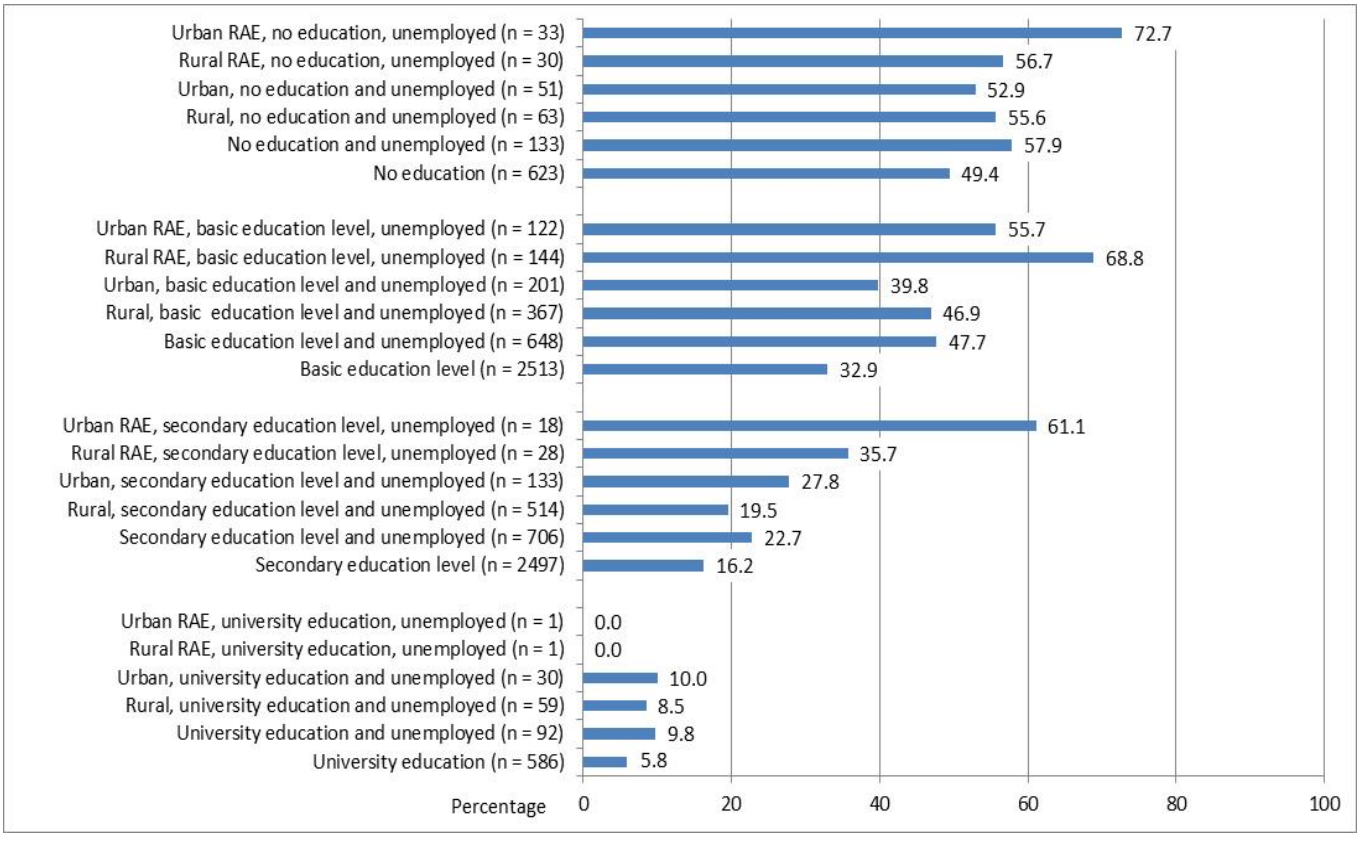


Affordability, poverty and limited-asset scenarios

Inadequate affordability conditions for population groups with multiple disadvantage (poverty scenario)



Inadequate affordability conditions for population groups with multiple disadvantage (limited-asset scenario)



The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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Original: English

This report gives a first assessment of the scale of environmental inequalities in Obiliq/Obilić and Fushë Kosovë/Kosovo Polje, and the role of socioeconomic, demographic, spatial and ethnic determinants in creating these inequalities. The analysis is based on a field survey and focuses on environmental vulnerabilities in relation to housing, water/hygiene/sanitation, environmental conditions and affordability constraints.

The findings show that there are marked inequalities in environmental disadvantage. The greatest inequalities are associated with socioeconomic and ethnic determinants, but spatial and demographic determinants also play a role. Most frequently, Roma, Ashkali and Egyptian (RAE) ethnicity, as well as low income and poor education, are identified as the strongest determinants of increased environmental disadvantage. Yet a range of environmental disadvantages is identified that affect large population groups as well.

The report helps to identify potential target groups for social and environmental action and presents a range of examples of the variability of environmental inequalities and vulnerabilities. It shows how environmental equality and vulnerability can be assessed in methodological terms, and emphasizes the need for detailed analysis of inequalities and the most vulnerable population groups before action targeted at specific groups is determined.

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