Abstract: 174 words
Body text: 2,520 words
Number of references: 39
Number of tables: 3

The Prevalence of Disability among Roma and non-Roma Children in Four West Balkan Countries

Key words

Disability, Roma, Children, Middle-income countries, MICS, UNICEF

Abstract

Background

Very little is known about the prevalence of disability among Roma children.

Objective

To estimate the prevalence of disability among Roma and non-Roma children in four West Balkan countries.

Methods

Secondary analysis of data collected in Round 6 of UNICEF's Multiple Indicators Cluster Surveys. Nationally representative samples of 6,290 Roma and 13,005 non-Roma children in Kosovo, Montenegro, the Republic of North Macedonia and Serbia.

Results

Roma children were twice as likely to have a disability than their peers and were more likely to have functional limitations in all but one of the domains investigated. Adjusting risk estimates to take account of between-group differences in household wealth and maternal education led to modest attenuation of effect sizes for risk of disability.

Conclusions

Disability is significantly more prevalent among Roma children than among their non-Roma peers in four Western Balkan countries. Future research should focus on the extent to which differences in disability may be attributable to differential rates of exposure to a wider range of social determinants.

Introduction

Social and public health policy aimed at addressing inequities in health and wellbeing has increasingly emphasised the importance of paying specific attention to issues facing groups that are particularly marginalised or vulnerable. For example, the *2011 Rio Political Declaration on Social Determinants of Health* called on governments to 'develop policies that are inclusive and take account of the needs of the entire population *with specific attention to vulnerable groups* and high-risk areas' [emphasis added].[1] The *WHO Review of Social Determinants and the Health Divide in the WHO European Region* called on governments to 'take action to develop systems and processes within societies that are more sustainable, cohesive and inclusive, *focusing particularly on groups most severely affected by exclusionary processes*' [emphasis added].[2] Two of the marginalised groups highlighted in the *WHO Review* were Roma peoples and people with disabilities.

As the *WHO Review* explains 'the term Roma is used widely to describe highly heterogeneous groups of people who may describe themselves as Roma, Gypsies, Travellers, Manouches, Ashkali, Sinti and other titles'.[2] With an estimated population of approximately 10-12 million, they constitute the largest minority ethnic community in Europe.[2-4] The *WHO Review* concluded that 'Roma across the Region are exposed to powerful social, economic, political and cultural exclusionary processes (including prejudice and discrimination) that negatively affect their human rights and restrict their self-determination ..... [and that] this situation is leading to gross inequities in health and well-being among Roma compared to other populations'.[2]

While the evidence that does exists suggests that the health needs of the Roma population are considerable,[5-8] most reviews have also drawn attention to significant gaps in the evidence base (e.g., the limited number of studies that have focused on children or reported on non-communicable disease) and the low methodological quality of many studies (e.g., the use of convenience samples and the common absence of non-Roma comparison groups).[5-8]

In particular, very little attention has been paid to the extent of disability among Roma populations.[7, 8] While the existing literature suggests a higher prevalence among Roma of health conditions or impairments that are commonly associated with disability (e.g., congenital disorders,[9, 10] Type 2 diabetes and metabolic syndrome,[11] obesity,[8] chronic condition among adults[12]), very few scientific papers have reported on the extent to which people experience limitations in their everyday activities or social participation. The exceptions suggest that higher rates of functional limitations exist among: Roma children and adults in Hungary;[13] Roma women aged 30-64 in Hungary;[14] and adult Roma of Irish origin in England.[15] In contrast, the UNDP/World Bank/EC Regional Roma Survey (undertaken in 12 Central European countries) reported no difference between Roma and non-Roma adults in the prevalence of activity limitations due to a health problem during the last 6 months.[16] Without prevalence of disability data for children with disability and significant cognitive delay compared to their non-disabled peers, the nature and extent of the interventions that may be required to overcome the likely loss of their developmental potential cannot be determined.[17]

The primary aim of the present paper is to partially redress this omission by estimating the prevalence of disability and significant cognitive delay among Roma and non-Roma children in four West Balkan countries.

Method

We undertook secondary analysis of nationally representative data collected in Round 6 (2017-) of UNICEF's Multiple Indicator Cluster Surveys (MICS6).[18] Following approval by UNICEF, MICS6 data were downloaded from http://mics.unicef.org/. MICS6 contains several questionnaire modules. Data used in the present paper were extracted from the household module, the module applied to all children under five living in the household and the module applied to a randomly selected child age 5-17 living in the household.[19] All participating countries used cluster sampling methods to derive samples representative of the national population of mothers and young children. In previous waves of MICS a small number of countries in the West Balkans undertook in parallel national surveys of Roma populations. In MICS 4 or 5, for example, Roma-specific surveys were undertaken in Bosnia and Herzegovina, Kosovo (under UNSC resolution 1244), Montenegro, North Macedonia and Serbia. In MICS6 four of these Western Balkan countries (Kosovo, Montenegro, the Republic of North Macedonia and Serbia) collected data on representative samples of children living in Roma households. Specific details of the sampling procedure and the procedures used for ethical review in each country are available in Country Reports available at http://mics.unicef.org/.[20-23]

Child Disability

MICS6 contained two new modules (one for 2-4-year-old children, the other for 5-17-year-old children) to identify children with disabilities. Developed by the Washington Group on Disability Statistics (WGDS: http://www.washingtongroup-disability.com/), the modules were based on informant report of child difficulties in nine functional domains for children aged 2-4 (seeing, hearing, walking, fine motor, understanding, being understood, learning, playing, controlling behaviour) and 14 domains for children 5-17 (seeing, hearing, walking, self-care, being understood inside the household, being understood outside the household, learning, remembering, focusing, accepting change, making friends, anxiety, depression, controlling behaviour). Four response options were available for all domains other than the anxiety, depression and behaviour domains ([1] '*no*

difficulty', [2] '*some difficulty*', [3] '*a lot of difficulty*', [4] '*cannot do at all*'). The controlling behaviour domain had five response options ([1] '*not at all*', [2] '*less*', [3] '*the same*', [4] '*more*' or {5] '*a lot more*') as did the anxiety and depression domains ([1] '*daily*', [2] '*weekly*', [3] '*monthly*', [4] '*a few times a year*', [5] '*never*').

Following Initial validation of the new modules in three low/middle income countries the WGDS recommended defining disability as having at least '*a lot of difficulty*' in one or more domains or having 'daily' problems with either anxiety or depression or having 'a lot more difficulty' in controlling behaviour. We used recommended WGDS cut-off to define child disabilities and child disabilities associated with the specific functional limitations listed above.

In addition, we created a separate binary variable of multiple disability (at least 'a lot of difficulty' in two or more areas; reference group no disability). Within the multiple disability group, the strongest associations between functional impairments (r>= +0.400) were between anxiety and depression, controlling behaviour and concentrating/making friends/speech, concentrating and accepting change/remembering/self-care/speech, hearing and understanding, learning and speech/remembering, walking and playing/self-care/fine motor skills, and self-care and speech.

For all disability measures the reference group was children without disabilities. Disability data were missing for 1.1% of children.

Significant Cognitive Delay

The child under five module also contained the Early Child Development Index (ECDI), a ten item scale with four domains (literacy-numeracy; physical; social emotional; and learning), each item being based on milestones that children are expected to achieve by age 3/4.[24] ECDI data were collected for children in the age range 36-59 months. We used the procedure outlined by Emerson et al to identify children with significant cognitive delay (SCD) as a failure to score positively on any of the five items in the literacy-numeracy and learning domains.[25, 26] All items were based on key informant report with simple binary (yes/no) response options.

- *Literacy-numeracy:* Can the child: (1) identify/name at least ten letters of the alphabet; (2) read at least four simple, popular words; (3) name and recognize the symbols of all numbers from 1 to 10?
- *Learning*: Can the child: (4) follow simple directions on how to do something correctly; (5) when given something to do, do it independently?

The five items demonstrated a modest internal consistency across the whole sample (alpha=0.51). SCD data were missing for 1.1% of children.

Household Wealth

Household wealth is likely to be associated with the prevalence of child disability.[27, 28] MICS6 data includes a within-country wealth index for each household based on the assets owned by that household weighted by principal component factors scores. The wealth index is assumed to capture underlying long-term wealth through information on the household assets.[29-32] These data were collected in all countries. Data were complete for all children.

Maternal Education

Level of maternal education is also likely to be associated with the prevalence of child disability.[27] MICS data records the highest level of education received by the child's mother was recorded using country-specific categories. Following the procedures used by Emerson and colleagues, we recoded these data into a three-category measure: (1) no education; (2) primary education; (3) receipt of secondary or higher-level education.[25, 33] These data were collected in all countries. Data were missing for 0.2% of children.

Approach to Analysis

All analyses were undertaken in Stata 16.1. In the first stage of analysis, we used simple bivariate descriptive statistics to estimate the prevalence of child disability and significant cognitive delay among children growing up in Roma households and children growing up in non-Roma households

(with 95% confidence intervals) for each country. Prevalence estimates were calculated using the svyset/svy routines to take account of the clustered sample designs. In the second stage of analysis, we used mixed effects multilevel modelling to estimate the risk of child disability and including significant cognitive delay among children growing up in Roma households (children growing up in non-Roma households being the reference group). Mixed effects multilevel modelling using Poisson regression of within-country associations were fitted in Stata using the mepoisson command to generate adjusted prevalence rate ratios (adjusted relative risk).[34] Random effects were specified to allow the slope and intercept of the relationship between Roma status and disability tom vary across countries. Two versions of the adjusted prevalence rate ratios are reported: Model 1 adjusts for basic child demographics (age, gender); Model 2 also adjusts for differences in the child's living situation (household wealth and level of maternal education). Adjusting for basic child demographics is important as disability is generally more common among boys and increases with child age.[35] Additionally, adjusting for between group differences in living situation is important as (as noted above) indicators of the living situation of children growing up in Roma settlements differ markedly from that of their non-Roma peers in ways that may be detrimental to their health and wellbeing.[2-4] UNICEF's country-specific child-level weights were used to take account of biases in sampling frames and household and individual level non-response. Given the small amount of missing data, complete case analyses were undertaken.

Results

Information on response rates and sample sizes are presented in Table 1. Prevalence estimates for each country for disability and significant cognitive delay are presented in Table 2. As can be seen, prevalence rates for: (1) disability were higher among Roma for all eight comparisons, significantly so for seven; (2) SCD were higher among Roma for all four comparisons, significantly so for two. Data aggregated across the four countries indicated that children with SCD were ten times more likely to have a disability (APRR=10.43(5.99-18.18)p<0.001), and 66 times more likely to have a functional limitation associated with learning (APRR=66.22(53.65-81.73)p<0.001) than children without significant cognitive delay.

Adjusted prevalence rate ratios pooled across the four countries are presented in Table 3 for disability, multiple disability, significant cognitive delay and each form of functional limitation associated with disability. In Table 3 the order of functional limitations associated with disability in each age group reflects overall prevalence rates (from most to least prevalence).

When compared with non-Roma children, Roma children under five were just over twice as likely to have a disability, four times more likely to have multiple disabilities and over 5 times more likely to have significant cognitive delay when risk was adjusted for between group differences in age and gender (Table 3). They were also more likely to have functional limitations in eight of the nine domains investigated, significantly so in five domains. When compared with non-Roma children, Roma children aged five to 17 were over twice as likely to have a disability and to have multiple disabilities when risk was adjusted for between group differences in age and gender (Table 3). They were also more likely to have functional limitations in all 14 domains investigated, significantly so in 13 domains. When these analyses were further adjusted to take account of between-group differences in relative household wealth and maternal level of education, risk of disability and multiple disability was reduced by 0% and 34% respectively for Roma children under five and by 5% and 25% respectively for Roma children aged five to seventeen.

196 Among 5-17-year-old Roma and non-Roma children with disability, by far the most prevalent
197 impairments associated with disability were anxiety (63.5% (95% CI 58.4%-68.3%) and depression
198 (23.7% (95% CI 20.4%-27.3%).

199

Discussion

Our analyses (based on nationally representative samples of 6,290 Roma and 13,005 non-Roma children indicated that: (1) Roma children under five were just over twice as likely to have a disability, four times more likely to have multiple disabilities and five times more likely to have significant cognitive delay than their peers when the risk was adjusted to take account of between group differences in age and gender, and were more likely to have functional limitations in eight of the nine domains investigated; (2) Roma children five and older were over twice as likely to have a disability and multiple disabilities than their peers when the risk was adjusted to take account of between group differences in age and gender, and were more likely to have functional limitations in all 14 of the domains investigated; (3) further adjusting risk estimates to take account of between-group differences in household wealth and level of maternal education led to marked attenuation of effect sizes for risk of multiple disabilities for Roma children.

Our results add significantly to the existing evidence base on Roma wellbeing in three important ways. First, they are one of the few studies published to date that report on the extent of disability among Roma and non-Roma children. Second, they add to the sparse literature on the prevalence of non-communicable disease among Roma children. Third, the sampling strategies used to generate nationally representative samples of Roma and non-Roma children with high response rates avoid some of the key methodological shortcomings that characterise much of the existing literature on Roma health.

Our results need to be considered in the context of several limitations. First, our ability to adjust risk estimates to take account of differential exposure to well-established social and environmental determinants of poor health was limited to just two variables (relative household wealth and level of maternal education). Inclusion of a wider range of variables (e.g., exposure to violence, discrimination, poor housing conditions, environmental pollutants) may have resulted in a more marked attenuation of risk.[2-4, 36, 37] Second, child disability was determined solely by parental report.

While such a procedure is understandable for younger children, the failure to include self-report formats for older children/adolescents can be considered problematic given: (1) the importance of children, including those with a disability, having a voice in research;[38] and (2) the evidence that the correspondence between child and parental report of child health status is often modest.[39, 40] Third, given the heterogeneity of Roma populations,[2] care needs to be taken in generalising the present results to Roma populations in other countries. Finally, most items relating to child disability require the parental informant to make a judgement between the capabilities of their child in relation to children of the same age. Given MICS is attempting to generate nationally representative data, this does require parents to have robust knowledge of the capabilities of children at specific ages in the country in which they live. There is evidence to suggest that this question format can lead to systematic biases involving the under-reporting of disability in poorer households/areas and the over-reporting of disabilities in wealthier households/areas.[41]

Overall, our results indicate that disability is significantly more prevalent among Roma children than among their non-Roma peers in four Western Balkan countries. Future research is needed to determine; (1) whether the differences for children are also apparent between adult Roma and non-Roma women and men; and (2) the extent to which differences in disability status for children may be attributable to differential rates of exposure to a wider range of social determinants of health. Our results also suggest that attempts to support Roma children in the Western Balkans will need to be sensitive to the importance and impact of disability in relation to such issues as prevention, service delivery and empowerment, and that attempts to break the cycle of the exclusion of Roma children in the Western Balkans[36] may need to specifically address the situation of Roma children with disabilities.

Acknowledgements

We would like to thank the UNICEF's global Multiple Indicator Cluster Surveys (MICS) program for allowing us to use the datasets.

References

1. World Health Organization. *Rio Political Declaration on Social Determinants of Health (http://www.who.int/sdhconference/declaration/en/)*. Geneva: World Health Organization; 2011.

2. World Health Organization Regional Office for Europe. *Report on social determinants and the health divide in the WHO European Region: Final Report (updated)*. Copenhagen: World Health Organization Regional Office for Europe; 2014.

3. Commissioner for Human Rights. Human rights of Roma and Travellers in Europe. Strasbourg: Council of Europe; 2013.

4. European Union Agency for Fundamental Rights, UNDP. The situation of Roma in 11 EU Member States: Survey results at a glance. Luxembourg: Publications Office of the European Union; 2012.

5. Hajioff S, McKee M. The health of the Roma people: A review of the published literature. *Journal of Epidemiology & Community Health.* 2000;54:864–869.

6. Fernández-Feito A, Pesquera-Cabezas R, González-Cobo C, Prieto-Salceda MD. What do we know about the health of Spanish Roma people and what has been done to improve it? A scoping review. *Ethnicity & Health.* 2019;24:224-243.

7. Van Dijk JP. Roma health: Do we know enough? *International Journal of Public Health.* 2019;64:647–648.

8. Cook B, Wayne GF, Valentine A, Lessios A, Yeh E. Revisiting the evidence on health and health care disparities among the Roma: a systematic review 2003–2012. *International Journal of Public Health.* 2013;58:885–911.

9. Koupilova I, Epstein H, Holcik J, Hajioff S, McKee M. Health needs of the Roma population in the Czech and Slovak Republics. *Social Science & Medicine.* 2001;53:1191–1204.

10. Martinez-Frias ML, Bermejo E. Prevalence of congenital anomaly syndromes in Spanish gypsy population. *Journal of Medical Genetics.* 1992;29:483–486.

11. Kosa Z, Moravcsik-Kornyicki A, Dioszegi J, et al. Prevalence of metabolic syndrome among Roma: A comparative health examination survey in Hungary. *European Journal of Public Health.* 2015;25:299–304.

12. Masseria C, Mladovsky P, Hernandez-Quevedo C. The socio-economic determinants of the health status of Roma in comparison with non-Roma in Bulgaria, Hungary and Romania. *European Journal of Public Health.* 2010;20:549–554.

13. Vincze F, Földvári A, Pálinkás A, et al. Prevalence of Chronic Diseases and Activity-Limiting Disability among Roma and Non-Roma People: A Cross-Sectional, Census-Based Investigation. *Int Journal of Environmental Research & Public Health.* 2019;16:3620.

14. Kosa Z, Szeles G, Kardos L, et al. A comparative health survey of the inhabitants of Roma settlements in Hungary. *American Journal of Public Health.* 2007;97:853–859.

15. Parry G, Van Cleemput P, Peters J, Walters S, Thomas K, Cooper C. Health status of Gypsies and travellers in England. *Journal of Epidemiology & Community Health.* 2007;61:198.

16. Mihailov D. The health situation of Roma communities: Analysis of the data from the UNDP/World Bank/EC Regional Roma Survey 2011. Roma Inclusion Working Papers. Bratislava: United Nations Development Programme; 2012.

17. Emerson E, Llewellyn G. The Circumstances of Children with and without Disabilities or Significant Cognitive Delay Living in Ordinary Households in 30 Middle- and Low-Income Countries. *Disabilities.* 2021;1:174–186.

18. UNICEF. Monitoring the Situation of Children and Women for 20 Years: The Multiple Indicator Cluster Surveys (MICS) 1995–2015. New York: UNICEF; 2015.

19. Khan S, Hancioglu A. Multiple Indicator Cluster Surveys: Delivering Robust Data on Children andWomen across the Globe. *Studies in Family Planning.* 2019;50:279-286.

20. Statistical Office of Montenegro (MONSTAT), UNICEF. 2018 Montenegro Multiple Indicator ClusterSurvey and 2018 Montenegro Roma Settlements Multiple Indicator Cluster Survey, Survey Findings Report. Podgorica, Montenegro: MONSTAT and UNICEF; 2019.

21. State Statistical Office, UNICEF. 2018-2019 North Macedonia Multiple Indicator Cluster Survey and 2018-2019 North Macedonia Roma Settlements Multiple Indicator Cluster Survey, Survey Findings Repor. Skopje, North Macedonia: State Statistical Office and UNICEF; 2020.

22. Statistical Office of the Republic of Serbia, UNICEF. Serbia Multiple Indicator Cluster Survey and Serbia Roma Settlements Multiple Indicator Cluster Survey, 2019, Survey Findings Report. Belgrade, Serbia: Statistical Office of the Republic of Serbia and UNICEF; 2019.

23. Kosovo Agency of Statistics, UNICEF. 2019–2020 Kosovo Multiple Indicator Cluster Survey and 2019–2020 Roma, Ashkali and Egyptian Communities Multiple Indicator Cluster Survey, Survey Findings Report. Prishtina, Kosovo: Kosovo Agency of Statistics and UNICEF; 2020.

24. UNICEF. The formative years: UNICEF's work on measuring early childhood development. New York: UNICEF; 2014.

25. Emerson E, Savage A, Llewellyn G. Significant cognitive delay among 3- to 4-year old children in low- and middle-income countries: prevalence estimates and potential impact of preventative interventions. *International Journal of Epidemiology.* 2018;47:1465–1474.

26. Emerson E, Savage A, Llewellyn G. Prevalence of underweight, wasting and stunting among young children with a significant cognitive delay in 47 low and middle-income countries. *Journal of Intellectual Disability Research.* 2020;64:93-102.

27. Cappa C, Mont D, Loeb M, et al. The Development and Testing of a Module on Child Functioning for Identifying Children with Disabilities on Surveys. III: Field Testing. *Disability and Health Journal.* 2018;11:510-518.

28. Banks LM, Kuper H, Polack S. Poverty and disability in low- and middle-income countries: A systematic review. *PLoS One.* 2017;12:e0189996.

29. Rutstein SO. The DHS Wealth Index: Approaches for Rural and Urban Areas. DHS Working Papers No. 60. Calverton, Maryland: Macro International Inc; 2008.

30. Rutstein SO, Johnson K. The DHS Wealth Index: DHS Comparative Reports No. 6. Calverton, Maryland: ORC Macro 2004.

31. Howe LD, Galobardes B, Matijasevich A, et al. Measuring socio-economic position for epidemiological studies in low- and middle-income countries: a methods of measurement in epidemiology paper. *International Journal of Epidemiology* 2012;41:871-886.

32. Poirier MJP, Grépin KE, Grignon M. Approaches and Alternatives to the Wealth Index to Measure Socioeconomic Status Using Survey Data: A Critical Interpretive Synthesis. *Social Indicators Research.* 2020;148:1-46.

33. Emerson E, Llewellyn G. The exposure of children with and without disabilities to violent parental discipline: Cross-sectional surveys in 17 middle- and low-income countries. *Child Abuse & Neglect.* 2021;111:104773.

34. Rabe-Hesketh S, Skrondal A. *Multilevel and Longitudinal Modelling Using Stata. Volume II: Categorical Responses, Counts, and Survival.* 3rd ed. College Station, TX: Stata Press; 2012.

35. Blackburn C, Read J, Spencer N. Prevalence of childhood disability and the characteristics and circumstances of disabled children in the UK: Secondary Analysis of the Family Resources Survey. *BMC Pediatrics.* 2010;10.

36. Robayo-Abril M, Millán N. Breaking the Cycle of Roma Exclusion in the Western Balkans. Washington, DC: World Bank; 2019.

37. Regional Cooperation Council. Balkan Baromiter 2020. Sarajevo: Regional Cooperation Council; 2020.

38. Weil LG, Lemer C, Webb E, Hargreaves DS. The voices of children and young people in health: where are we now? *Archive of Diseases of Childhood.* 2015;100:915-917.

39. Eiser C, Morse R. Can parents rate their child's health-related quality of life? Results ofv a systematic review. *Quality of Life Research* 2001;10:347-357.

40. Arman S, Amel AK, Maracy MR. Comparison of parent adolescent scores on Strengths and Difficulties Questionnaire. *Journal of Research in Medical Sciences.* 2013;18:501–505.

41. Emerson E, Llewellyn G. Identifying children at risk of intellectual disability in UNICEF's multiple indicator cluster surveys: cross-sectional survey. *Disability and Health Journal.* 2021 14:100986.

Table 1: Survey Details by Country					
	Year of survey	Response rate		Sample size	
		Children age 2-4	Children age 5-17	Children age 2-4	Children age 5-17
Kosovo					
Roma	2019/20	85.7%	86.6%	335	517
National	2019/20	78.2%	80.1%	1,813	2,353
Montenegro					
Roma	2018	63.7%	63.3%	341	466
National	2018	60.7%	60.5%	673	2,012
North Macedonia					
Roma	2018/19	90.0%	91.8%	424	1,505
National	2018/19	86.3%	86.8%	921	1,476
Serbia					
Roma	2019	92.6%	94.0%	649	2,053
National	2019	79.5%	80.8%	1,110	2,647
Note: Sample sizes are weighted and only include participants for who valid data on disability status are available					

Table 2: Country Prevalence Estimates for Disability and Significant Cognitive Delay			
	Disability (age 2-4)	Significant Cognitive Delay (age 3-4)	Disability (age 5-17)
Kosovo			
Roma	5.0% (2.8-8.8)	6.4%*** (3.2-12.3)	16.8%*** 12.6-21.9)
National	3.2% (2.1-4.7)	0.8% (0.3-2.0)	8.7% (7.3-10.4)
Montenegro			
Roma	2.9%** (1.6-5.3)	6.7%** (4.0-10.9)	30.5%*** (26.5-34.8)
National	0.6% (0.2-1.8)	1.2% (0.3-4.7)	7.6% (5.4-10.7)
North Macedonia			
Roma	5.6%*** (3.8-8.3)	3.3% (1.8-5.9)	24.4%*** (19.5-30.0)
National	1.4% (0.7-2.6)	1.3% (0.5-2.9)	11.3% (8.5-14.7)
Serbia			
Roma	2.9%* (1.8-4.5)	0.3% (0.1-1.5)	14.0%*** (11.2-17.4)
National	1.6% (1.0-2.4)	0.0% (0.0-0.5)	4.9% (3.6-6.7)
Note: Prevalence significantly greater (design-based F) * p<0.05, ** p<0.01, *** p<0.001			

Table 3: Pooled adjusted prevalence rate ratios for disability, each form of functional limitation associated with disability and significant cognitive delay for children age 2-4 and age 5-17				
	Prevalence		Adjusted Prevalence Rate Ratios	
	Roma	National	Model 1	Model 2
Children age 2-4				
Significant cognitive delay	3.4% (2.2-5.4)	0.8% (0.4-1.4)	5.34*** (3.15-9.08)	3.74** (1.49-9.38)
Disability	4.0% (3.1-5.1)	2.0% (1.5-2.7)	2.29** (1.32-3.96)	2.29** (1.27-4.13)
Multiple Disability	1.4% (0.9-2.0)	0.3% (0.2-0.6)	4.01*** (2.51-6.42)	2.64** (1.38-5.05)
Functional limitations (as defined in WGDS modules) associated with …				
Being understood	1.7% (1.0-2.8)	1.0% (0.7-1.5)	2.08*** (1.65-2.62)	2.70*** (1.87-3.90)
Learning	1.2% (0.7-2.1)	0.8% (0.5-1.2)	1.60** (1.20-2.13)	1.51 (0.60-3.83)
Controlling behaviour	0.7% (0.4-1.2)	0.6% (0.3-0.9)	1.45 (0.31-6.91)	1.56 (0.31-8.00)
Seeing	0.7% (0.4-1.3)	0.3% (0.1-0.6)	2.52* (1.10-5.74)	1.32 (0.36-4.82)
Playing	0.7% (0.4-1.2)	0.3% (0.2-0.6)	2.12 (0.85-5.29)	2.12 (0.46-9.82)
Fine motor	0.2% (0.1-0.5)	0.3% (0.1-0.6)	0.69 (0.20-2.44)	0.55 (0.09-3.50)
Understanding	0.8% (0.5-1.4)	0.2% (0.1-0.4)	4.88*** (3.13-7.63)	6.08*** (1.74-21.26)
Walking	0.4% (0.2-0.8)	0.1% (0.1-0.4)	2.47 (0.60-10.17)	1.23 (0.30-4.99)
Hearing	0.4% (0.2-0.8)	0.0% (0.0-0.2)	9.67** (2.31-40.39)	9.41** (2.42-36.54)
Children age 5-17				
Disability	19.4% (16.4-22.9)	7.7% (6.8-8.8)	2.24*** (1.95-2.57)	2.13*** (1.48-3.07)
Multiple Disability	8.6% (7.1-0.4)	2.6% (2.1-3.2)	2.77*** (1.72-4.43)	2.08** (1.21-3.58)
Functional limitations (as defined in WGDS modules) associated with …				
Anxiety	12.4% (9.7-15.8)	5.0% (4.2-5.9)	3.11*** (2.21-4.36)	2.45*** (1.90-3.17)
Depression	4.9% (3.8-6.2)	1.7% (1.3-2.2)	2.86*** (2.07-3.97)	2.04*** (1.73-2.40)
Accepting change	1.1% (0.7-1.6)	1.0% (0.7-1.4)	1.29 (0.41-4.01)	0.95 (0.29-3.13)
Learning	4.1% (2.9-5.6)	0.9% (0.6-1.4)	2.89** (1.39-5.99)	2.18* (1.04-4.58)
Making friends	1.4% (0.9-2.1)	0.8% (0.6-1.3)	1.75** (1.19-2.56)	1.99*** (1.47-2.69)

Walking 500m	1.4% (1.0-1.9)	0.7% (0.5-1.0)	2.04* (1.04-3.99)	1.64 (0.81-3.31)
Remembering	2.4% (1.6-3.5)	0.6% (0.4-0.9)	3.48*** (1.76-6.85)	1.45 (0.88-2.40)
Concentrating			1.91*** (1.57-2.31)	0.75 (0.25-2.28)
Being understood outside the household	1.0% (0.7-1.5)	0.5% (0.4-0.8)	1.79* (1.01-3.47)	1.20 (0.56-2.59)
Being understood inside the household	0.8% (0.4-1.3)	0.4% (0.2-0.6)	2.12*** (1.41-3.18)	1.50 (0.88-2.56)
Self-care	0.7% (0.4-1.1)	0.4% (0.2-0.6)	1.61* (1.00-2.57)	1.07 (0.64-1.81)
Seeing	0.9% (0.5-1.6)	0.2% (0.1-0.5)	3.42* (1.27-9.28)	3.36** (1.46-7.73)
Hearing	0.1% (0.0-0.3)	0.0% (0.0-0.1)	5.86* (1.27-27.06)	10.03 (0.94-106.70)
Controlling behaviour	2.1% (1.4-3.0)	0.6% (0.4-0.9)	3.52*** (2.85-4.34)	2.01*** (1.64-2.46)
Note: * p<0.05, ** p<0.01, *** p<0.001 Model 1: Adjusted for child age and gender Model 2: Also adjusted for relative household wealth and highest level of maternal education.				