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REVIEW

Revisiting the evidence on health and health care disparities among the Roma: a systematic review 2003–2012

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Abstract
Objectives To conduct a systematic review of the epidemiological and health service utilization literature related to the Roma population between 2003 and 2012.
Methods Systematic review of empirical research related to Roma health and health care utilization published between 2003 and 2012 identified through electronic databases (PsycInfo, Medline, Google Scholar). Methodological rigor was evaluated using a six-point set of design criteria.
Results We found evidence for lower self-reported health and significantly higher mortality risk for Roma compared to non-Roma, and greater prevalence of health risk factors for Roma children, including environmental risks, low birth weight, and lower vaccination coverage. Studies of non-communicable and infectious disease remain insufficient to make firm conclusions on disparities. Barriers to care include lack of documentation and affordability of care, though more studies on health care utilization are needed.
Conclusions Roma youth and adults are in need of programs that reduce health disparities and their increased mortality risk. Reducing exposure to risk factors such as smoking, obesity, and poor living conditions may be a target for interventions. More intervention studies and rigorous evaluations are needed.

Keywords Roma · Romani · Travelers · Systematic review · Health · Health care utilization

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Introduction

The Roma are one of the largest and most vulnerable minority groups in Europe, with an estimated population of 10 to 12 million, of which approximately 6 million live in Central and Eastern European countries (European Union 2008). Roma may be divided into several groups including English Romani Gypsies, Irish Travelers, and Roma from Central and Eastern Europe. Although the Roma were originally nomadic, today they consist of nomadic, semi-nomadic, and settled groups (Vermeersch and Ram 2009). The Roma have maintained a distinct identity characterized by language, communal solidarity, close extended family bonds, and cultural traditions. Roma have endured centuries of persecution and enforced assimilation, and have faced persistent inequalities, poverty, and social exclusion. Despite efforts in recent years by international institutions, NGOs, human rights groups, and others to raise awareness of Roma issues, substantial discrimination and exclusion remain (Vašecka and Radicová 2001).

While their poor socioeconomic situation is well documented, until recently much of the available health information on Roma had been derived from anecdotal evidence and community-level studies with inadequate sample sizes and poor reliability. Varying definitions and classification systems, and ethical and legal constraints presented major challenges to obtaining even basic data (Hajioff and McKee 2000). Systematic reviews conducted

in 2000 and 2003 identified high rates of communicable disease among Roma populations associated with crowded living conditions, poor water and sanitation, lower rates of immunization, and higher infant mortality (Hajioff and McKee 2000; Zeman et al. 2003). More recent reviews, though not systematic, note a growing body of research on non-communicable disease, and an increasing number of rigorous analytical studies (Foldes and Covaci 2012; Parekh and Rose 2011). Two recent reviews identify a growing weight of evidence of higher cardiovascular disease risk among Roma in Central Eastern Europe and Italy (Dobranici et al. 2012; Monasta et al. 2012).

Overall, these literature reviews conclude that Roma have poorer life expectancy and health outcomes and face discrimination in health care and other significant barriers to adequate health care, while describing numerous data and methodological limitations (Foldes and Covaci 2012; Hajioff and McKee 2000; Koupilova et al. 2001; Loewenberg 2006; Parekh and Rose 2011; Sepkowitz 2006; Zeman et al. 2003).

There is renewed attention to Roma health disparities in the wake of the decade of Roma inclusion 2005–2015, an initiative designed to eliminate discrimination and promote inclusion of Roma (European Union 2008). Implementing this initiative requires both increased availability of data on Roma health and methodologically rigorous studies to identify determinants of disparities. To describe the current state of research on Roma health and health care, we systematically reviewed the epidemiological and service use literature published between 2003 and 2012.

Methods

We conducted the systematic review in accordance with published guidelines (Moher et al. 2009). We searched for original empirical research related to Roma health status and health care utilization published in English from January 2003 to December 2012 using PsycInfo, Medline, and Google Scholar electronic databases. We began our search for articles published in 2003 so as to not overlap with prior systematic reviews of the Roma population (Hajioff and McKee 2000; Zeman et al. 2003). We conducted an initial search in March 2012 and a follow-up search in March 2013. In MedLine, we used pre-specified medical subject headings (MeSH) and keywords to identify studies regarding health or health care services (health, risk, disease, mortality, health status, health care, health access) for the Roma population (Roma, Roma children, Roma population, Romanies, Romany, Romani, gypsy, gipsy, gypsies, Travelers). These search terms were used to identify additional articles in PsycInfo and Google Scholar.

In initial screening, we excluded articles without an empirical component, articles pertaining to genetic disorders, and articles without Roma-specific health data. Two researchers independently reviewed the remaining publications. As the purpose of the current review was to assess the growing body of quantitative research on Roma health, qualitative studies were excluded. Methodological rigor was evaluated and documented. We note that travelers and Irish travelers are a population ethnically distinct from but similar in social practices and culture to Roma (Green and Lynch 2006). The present study is interested in all European Roma populations and all were treated as relevant for the purposes of the current study.

Data analysis

Two researchers summarized each paper and reviewed its methodological rigor. We abstracted data into a table describing the sampled population, study design and data collection instrument, statistical analysis, methods used to determine the presence of a disparity between Roma and non-Roma populations, and findings. We assessed the strength of the study design using a quality checklist numbering system adapted from De Silva et al. (2005) and Harden et al. (2004) to concisely evaluate a range of potential methodological concerns. A study was given the corresponding number if they fulfilled the following criteria: (1) sample selected was something other than a convenience sample to reduce sample selection bias and allow for generalizability to a larger population; (2) clear description of methods used to collect, analyze data, and assess disparities; (3) attempt made to establish non-self reported/objective assessment of the data; reliability and validity of the data; (4) sampled from multiple sites/communities/localities (rather than one site) to increase sample representativeness; (5) attempted to control for confounding by socioeconomic status or need, and (6) sufficient sample size and standard errors accurately reported. The organization of the studies and scoring was developed through an iterative process of reading and re-reading transcripts. Disagreements regarding study selection or the methodological assessment of studies were resolved in discussions between the two coders and adjudicated by a third team member.

Results

We identified 75 studies which fulfilled our inclusion criteria (see Fig. 1) and grouped them into nine categories based on their topic area: self-rated health, non-communicable disease and chronic illness, HIV/AIDS, other infectious disease, child and adolescent health, maternal

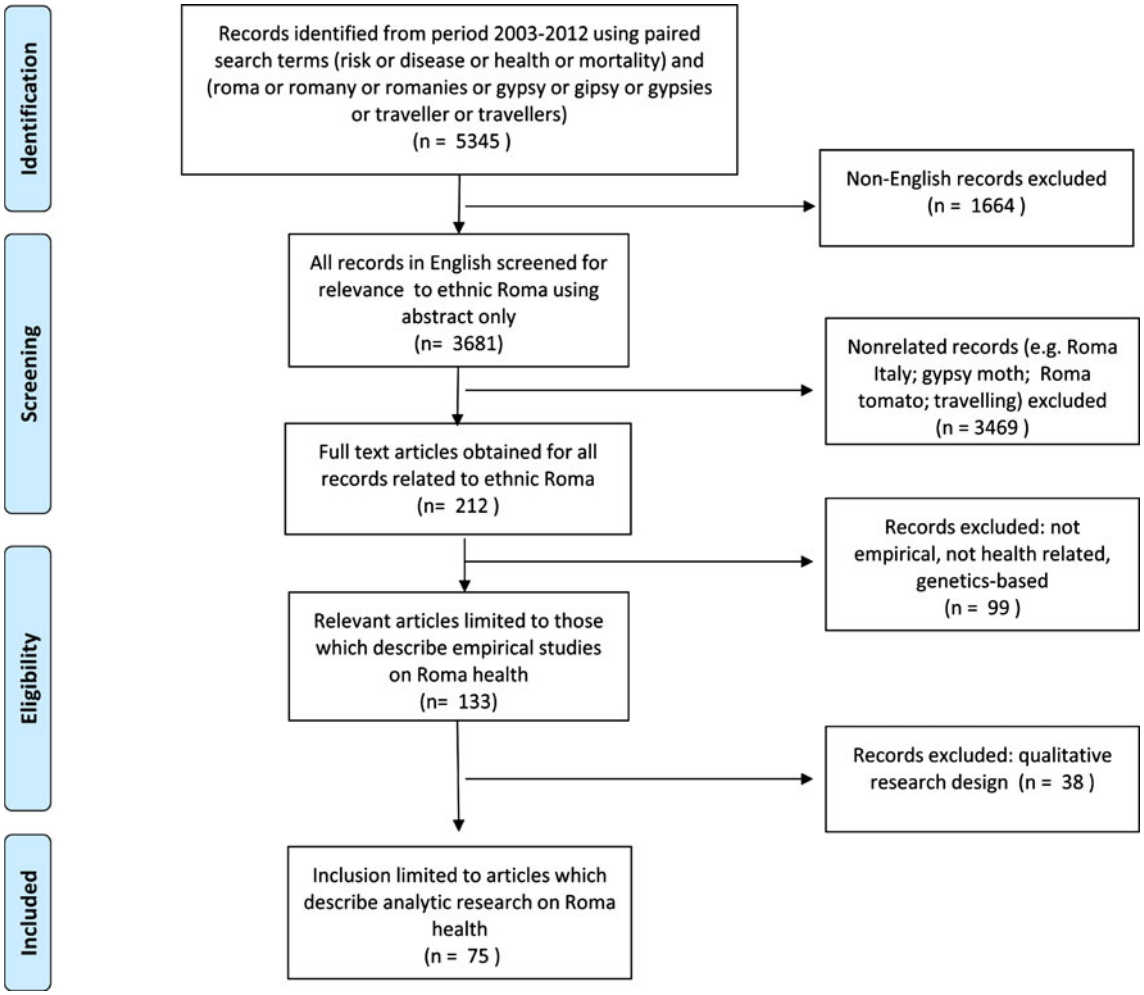

Fig. 1 Diagram of study selection

health and immunization, health behaviors, health service utilization, and adult and infant mortality (see Table 1).

Self-rated health

Studies examining Roma self-reported health had strong study designs, as seven of the eleven studies in this area met five of the six criteria for methodological rigor. Self-reported health status of Roma was poorer than non-Roma in studies set in Spain (Carrasco-Garrido et al. 2011), Hungary (Kosa and Adany 2007), Slovakia (Kolarcik et al. 2009), England (Parry et al. 2007; Peters et al. 2009), Sweden (Hassler and Eklund 2012), Greece (Vorvolakos et al. 2012), and Serbia, where rates of self-reported poor health were twice that of non-Roma (Janevic et al. 2012). These disparities remained significant even after adjustment for socioeconomic status (Janevic et al. 2012; Peters et al. 2009; Voko et al. 2009), particularly among Roma women (Carrasco-Garrido et al. 2011; Janevic et al. 2011; Vorvolakos et al. 2012). There is evidence that these disparities may actually be underestimated, as two studies indicated that Roma were more likely to underreport poor health status than non-Roma (Kolarcik et al. 2009; Van Cleemput et al. 2007). Roma were more likely than non-Roma to have low expectations for their health and to hold fatalistic health beliefs (Van Cleemput and Parry 2001).

Roma respondents reported higher rates of long-term illness and disability (Parry et al. 2007), lower psychological well-being and health-related quality of life (Hassler and Eklund 2012; Skodova et al. 2010; Van Cleemput and Parry 2001), and higher rates of depression than non-Roma (Carrasco-Garrido et al. 2011; Vorvolakos et al. 2012). In Bulgaria, Hungary, and Romania, Roma were more likely to report a year-to-year worsening of health conditions (Masseria et al. 2010). Compared to the general population, Roma in both Bulgaria and Romania were more likely to feel threatened by ill-health due to unhygienic circumstances, and Roma in Romania were more likely to report at least one chronic condition.

Table 1 Summary of systematic review and assessment of methodology of quantitative studies of Roma health and health care utilization between 2003 and 2012 in Europe

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Self-rated health						
Janevic et al. (2012)**	1, 2, 3, 4, 5, 6	14,313 Roma and 267 non-Roma aged 18+ in Serbia	Household Survey, random sample (2007 LSMS). Self-reported health status	Age-adjusted and multivariate regression, with and without SES covariates	Relative risk estimated with and without SES adjustment, and pairwise comparisons by ethnicity, gender, and poverty	Roma >2X to self-report poor health; SES factors were partial mediators of this difference. Roma women most likely to report poor health irrespective of poverty status
Hassler and Eklund (2012)	2, 6	99 Roma adults from residential college in Southwestern Sweden, 95 Sami people (Swedish minority) and 4,386 Swedes living in five different counties	Self- reported physical and mental health through a written questionnaire. Used the SF-12 as well as Antonovsky's Sense of Coherence Scale (SOC-13)	Compared means through *t* tests and correlations between scale variables through Pearson's test for correlation	Compared the scores of the Roma both to the scores of the Sami and the general Swedish population	Roma had poorer physical and mental health scores than general population and poorer physical health than the Sami. Roma had lower sense of coherence score than general population or Sami, possibly due to low social position and experience of discrimination, but higher qualitative scores reflecting strong social ties to community
Vorvolakos et al. (2012)	2, 6	122 Roma and 132 Greek patients in an outpatient psychiatric in Alexandroupolis, Greece	Used Greek Instrument versions of the SCID-I for DSM-III-R'; the International Personality Disorder Examination and the Derogatis Psychiatric Rating Scale administered by a psychiatrist	Chi-squared tests with Yates' correction for comparison of qualitative variables as well as *t* tests	ANCOVA test for differences between Roma and majority on DPRS symptom dimensions and GPI	Roma women were over-represented among clinic patients and less frequently diagnosed with psychotic and bipolar disorders. Roma had more symptoms of depression, anxiety, phobic anxiety, sleep disturbance, abjection-disinterest, excitement and somatic manifestations
Carrasco-Garrido et al. (2011)**	1, 2, 3, 4, 6	527 Roma women and 1054 non-Roma women in Spain	National survey with booster sample of 1500 Roma, probability sample. Health conditions, self-rated health, and health service use	Bivariate and multivariate logistic regressions (some adjusting for education)	Significance of ethnicity coefficients in multivariate regressions	Roma women more likely to report poor health, obesity, depression, migraines, alcohol use, and more inequality in use of health care

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Masseria et al. (2010)	1, 2, 4, 5, 6	Roma and non-Roma aged 17+, 2,536 in Bulgaria, 2,640 in Hungary, 3,292 in Romania	Household survey. Self-reported health status	Logit model. Self-assessed health, chronic illness, sanitary conditions; adjusted for age, sex, SES	Significance of ethnicity coeffiicients, adjusting for multiple characteristics	Roma more threatened by ill-health due to unhygienic circumstances in two countries; Roma in Romania more likely to report at least one chronic condition
Skodova et al. (2010)	1, 2, 3, 5, 6	138 coronary patients in Eastern Slovakia: 46 Roma (low SES), 46 non-Roma (low SES), and 46 high SES non-Roma	Survey of patients from cardiac care center. GHQ 28 (physical symptoms, anxiety, social function and depression), Maastricht Exhaustion Interview, Type D personality scale, Cook-Medley hostility scale, SF-36	Hierarchical linear regressions (not adequately described)	Ethnicity coefficient in multilevel regression analysis; three stepped regression models adding income/education and then disease severity	Roma had poorer scores on psychological well-being, vital exhaustion, and health-related quality of life, but differences partially explained by SES. No ethnic differences in negative affectivity, social inhibition, or hostility
Voko et al. (2009)**	1, 2, 3, 4, 5, 6	4,121 Hungarian respondents, 936 Roma living in settlements in NE Hungary, all aged 18–64	Household survey, random sample. Self-reported general health, functional limitation, smoking, fruit/vegetable consumption, cooking fat	Logistic regressions for associations between ethnicity and dependent variables; adjusted for SES	Ethnicity coefficient in multivariate logistic regressions with and without SES	Odds of poor health or functional limitation >2X higher for Roma, but equal after SES adjustment. Behavioral differences (smoking, consumption, cooking) not fully explained by SES
Peters et al. (2009)**	1, 2, 3, 4, 5	256 Traveler and 256 non-Traveler adults (148 White, 57 Afro-Caribbean, 51 Pakistani Muslims) in England	Traveler's quota sampled from five sites, matched by sex and age with non-travelers. EQ-5D for health status; other standardized health measures	Unadjusted ANOVA and multiple regression adjusting for sex, age, and smoking	Tests of unadjusted differences and significance of ethnicity coefficients in multivariate models	Travelers have worse health on EQ5D and other measures compared to Whites and other minorities. Differences with Whites persist after adjustment for age, sex, and smoking. Travelers less likely to visit chiropoidist, dentist, nurses, or NHS Direct, and to be registered with GP
Parry et al. (2007)	1, 2, 3, 4	293 Traveler adults and 260 non-Travelers in England	Traveler's quota sampled from five sites, matched by sex and age with non-Travelers. EQ-5D for health status; other standardized health measures	Chi-square and Wilcoxon matched pairs tests to compare groups	Significance between matched pairs based on unadjusted tests	Travelers have worse health on EQ-5D, and more likely to have long-term illness, health problem or disability. Traveler women more likely to report miscarriages and to lose child, less likely to report hypertension

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Kosa et al. (2007)**	1, 2, 3, 4, 6	4,121 Hungarian respondents, 936 Roma living in settlements in NE Hungary, all aged 18–64	Household survey, random sample. Self-reported health, functional limitation, BMI, smoking, alcohol	Comparison of unadjusted prevalence rates weighted to generalize to overall populations	Comparisons of rates of dependent variables stratifying by age and gender	Roma report worse health status overall and by age and income. Prevalence of smoking 2–5 times higher, no differences in heavy drinking; worse diet
Van Cleemput et al. (2007)	2, 4	27 Traveler adults, selected from sample of 269 adults in England	Qualitative semi-structured interviews. Self-report on access and use of health services, preventive care, health knowledge	Qualitative analysis in four stages: coding, thematic framework, descriptive accounts and interpretative analyses	Disparities not measured	Poor health attributed to social hardship, environmental conditions, and low health expectations. Overriding perception of social exclusion damaging to health, particularly mental health
Non-communicable disease and chronic illness						
Molnar et al. (2011)	2, 3, 5, 6	1,067 patients from one kidney transplant clinic in Budapest, Hungary; 60 identified as Roma	Collected transplant information, laboratory measurements, and self-reported comorbidity on all patients who received a kidney transplant between 1977 and 2002. Primary outcome measure was mortality	Cox regression analysis to examine the association between Roma ethnicity and mortality due to any cause. Association between Roma ethnicity and outcomes examined in separate multivariate models	Comparison between Roma transplant patients and other consenting patients treated in the same center	Roma transplant patients had greater mortality (adjusting for other covariates) and worse graft outcomes
Zeljko et al. (2012)**	2, 3, 4, 6	Population-based survey respondents from rural Croatia, 1993–1995 and 2003; 430 identified as Roma	Convenience sample; biometric traits and blood work assessing for glucose, triglycerides, total cholesterol, HDL, LDL and BMI; standard cut-offs for all variables applied	Age-adjusted prevalence among Roma calculated (10-year age cohorts) for all CVD variables. Univariate analysis stratified on gender conducted	Chi square test for differences between Roma and non-Roma; age trend for CVD risk among Roma compared to total sample	Compared to the general population, Roma experience a higher burden of CVD risk, primarily from smoking and high glucose. Significant differences noted between women and men; the young and aged
Hidvegi et al. (2011)**	2, 3, 4, 6	77 patients from GPs reporting a high proportion of patients who self- identify as "Gypsy" in Hungary	Collection of basic anthropometric data, blood pressure, medical history, glucose tests for pre-diabetes, diabetes, and metabolic syndrome	2 sample *t* test for inter-group comparisons.	Comparison of the prevalence of metabolic syndrome and type II diabetes against published prevalence in the general population	Compared to the representative population of Hungary, Roma patients had a higher prevalence of metabolic syndrome (50.6 % of the Roma sample), diabetes mellitus (18.2 %), and pre-diabetes

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Jiménez-Sánchez et al. (2013)**	1, 2, 3, 4, 5, 6	Two national surveys- (a) 2006 SNHS, includes 16,079 adults comprising representative Spanish sample; (b)national Roma health survey in Spain, 1,500 Roma of Spanish nationality	Three identical questions asked in surveys related to suffering from migraines; a clinician confirmed diagnosis ,and being disabled by migraines. Sociodemographics, self-perceived health status, health behaviors, lifestyle and comorbid physical illnesses collected	Bivariate logistic regression models to estimate association of principal variables; multivariate analysis for variables statistically significant in the bivariate analysis conducted	Comparison between calculated prevalence of migraines in the 2006 Spanish National Health Survey and the prevalence in the 2006 National Health Survey in the Roma population	Higher prevalence of migraines among Roma than the general population. Migraines associated with unemployment, poor self-perceived health, inadequate sleep, obesity, arthritis, allergies, and depression
Kolvek et al. (2012)	2, 3, 4, 6	1,407 patients from 18 dialysis units in Slovakia; 146 identified as Roma	Convenience sample; data from adults and pediatric patients (>19 years) treated at dialysis units. Compared risk of Roma for ESRD against the remaining Slovak population	Estimated risk of ESRD for Roma compared to the remainder of Roma population and summary of risk across all ages using direct standardization. Poisson regression analyses to model risks for ESRD	Comparison of Roma patients against remainder of Slovak patients treated through hemodialysis	Roma patients suffering from ESRD younger than other patients. Risk for ESRD for Roma 1.34 times higher than the rest of the population and diabetic nephropathy more likely to occur for Roma patients
Zivkovic et al. (2010)	2, 4	1,465 Roma in Serbia aged 18+	Convenience sample from 11 urban and 8 rural areas. Capillary blood glucose measurement and visual abdominal obesity check	Unadjusted differences by urban areas, obesity, and family history of diabetes; multinomial logistic regression estimating differences in diabetes prevalence	No comparison group, so rates compared to previous studies	Diabetes more prevalent in urban areas and among those with diabetes family history. High rates of abdominal obesity and diabetes suggest that diabetes rates higher among Roma population
Dorkova et al. (2010)	2, 3, 5	137 non-Roma and 23 Roma referred for a diagnostic at a hospital sleep laboratory in Slovakia	Overnight polysomnography, anthropometric variables and standard biochemical analyses	Unadjusted tests (Chi-square and *t* tests) and multiple linear regression	Significance of ethnicity indicator coefficient	Rates of obstructive sleep apnoea (OSA), apnoea-hypopnoea, and waist circumference significantly higher for Roma. Roma ethnicity predictive of higher OSA rates independent of age, gender, and waist circumference
Gualdi-Russo et al. (2009)	2, 3, 4	32 Roma males and 38 Roma females from Balkans compared with 104 male and 58 female non-immigrant Italians	Convenience sample of health clinics in Bologna, Italy. Interview and clinical visit (anthropometric data and blood pressure)	Unadjusted descriptive statistics to compare Roma with non-immigrant Italians by sex	Unadjusted comparisons (*t* tests, Chi-square tests, and ANOVA) between Roma and non-immigrant Italians by sex	Male Roma had high risk for CVD, >50 % overweight and greater mean BMI than native Italians. Roma woman had high CVD risk with higher blood pressure and waist circumference

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Zeljko et al. (2008)	3, 4, 5, 6	423 Bayash Roma in two regions of Croatia	Convenience sample of residents in two Roma settlements. Anthropometric data, blood pressure, and self-reported smoking	Unadjusted tests using Fisher's exact and *t* tests. Multivariate regressions for associations between hypertension and CVD risk factors	Disparity measured by comparison with usual reports of hypertension in Croatia	Hypertension in 25 % of Roma population, lower than that in general population. However, high smoking rates (70 %), being overweight, and lack of treatment for those with hypertension
Skaric-Juric et al. 2007)**	2, 4, 5, 6	266 adult Bayash Roma in two regions of Croatia	Voluntary field study with interviews and anthropometric data. Self-reported diet, smoking, reproduction, health problems, medications; measured BMI	Unadjusted differences and non-parametric Kruskal–Wallis tests; multivariate logistic regression for predictors of reproductive health and illness within Roma population	No comparison group; comparisons to Croatian population rates from other studies	Roma had similar rates of nutritional status and BMI, more likely to be underweight, and higher smoking rates. Roma had lower insurance coverage, employment, marital age, and education, less likely to have indoor toilet, and higher numbers of children and abortions
Siváková et al. (2007)	2, 3, 6	150 Roma in Slovakia	Cross-sectional survey of volunteers from a community to identify dietary habits (24 h dietary recall) and behavioral risk factors for atherosclerosis	Unadjusted comparisons using *t* tests and Chi-square tests	Comparisons to national data by sex	Nutrient intake and health behavior of Roma increases atherosclerosis risk. Roma males had greater animal protein intake, less plant protein, and folate. Roma women had less plant protein and vitamin E
Krajcovicova-Kudlackova et al. (2004)	1, 2, 3, 4	122 Roma and 137 non-Roma aged 19–35 years in Slovakia	Physical and biometric survey of cardiovascular risk factors among random sample. Blood samples, self-reported health and psychosocial factors; BMI measures	Chi-squared test to compare group characteristics, cardiovascular risk factors, antioxidative vitamin levels	Significance of Chi-squared test used to compare cardiovascular risk factors among Roma and non-Roma	Smoking and dyslipidemia more prevalent among young Roma, while hypertensive factors were similar to non-Roma. Roma had decreased HDL-cholesterol, increased triglycerides, poorer nutrition, and higher incidence of obesity, insulin levels and resistance. Education a possible mediator of ethnic differences

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Vozarova de Courten et al. (2003)	1, 2, 3, 5, 6	156 Roma and 501 non-Roma in Zlate Klasy, a village in Southern Slovakia	Population-based survey. All village members invited with 53 % response for non-Roma and 28 % for Roma. Cholesterol, blood pressure, glucose test, self-reported tobacco/alcohol	Prevalence rates adjusting for age and sex. Multivariate regression adjusting for covariates for relationship between risk factors and disease	Roma coefficient in multivariate logistic regression adjusting for age and sex	Roma had higher prevalence of type 2 diabetes, obesity, metabolic syndrome, and cardiovascular disease, but similar rates of hypertension. Lower physical activity and higher smoking rates among Roma, though diabetes differences persist after adjustment for these factors
HIV/AIDS						
Djonic et al. (2012)	2, 3, 4, 6	411 Roma youth in Belgrade and Kragujevac, Serbia	Cross-sectional survey using respondent-based sampling. Tested participants for HIV, HCV, syphilis antibodies. Participants responded STI risk behaviors and knowledge questionnaire, service access and health care	Point estimates of each dependent variable derived calculated for each city, adjusting for network size and recruiter–recruit homophily using a respondent-driven sampling analysis tool	Disparity measured by comparison to published prevalence in general Serbian population	Roma youth had higher prevalence of STI's and risky behaviors than rates for Serbian youth. Roma report higher incidence of early sexual debut, lack of consistent condom use, multiple sexual partners; females report higher incidence of having had an abortion. Negative attitudes/limited knowledge of HIV/STI's reported
Sipetic et al. (2012)	2, 4, 6	91 Roma sex workers and 100 non-Roma sex workers from Belgrade, Serbia	Snowball sampling. Demographic information, literacy questions, knowledge of HIV transmission and sex-related behavior and use of psychoactive substances collected	Unadjusted tests of differences of risky sexual behaviors between Roma and non-Roma sex workers; Multiple logistic regression tested for determinants of risk for HIV infection	Used Chi-square tests, Fisher's exact test and *t* tests to evaluate differences between risky sexual behaviors of Roma and non- Roma sex workers	Respondents did not differ in risky sexual behavior or frequency of STIs. Roma reported less education, earlier first sexual experience. Both Roma and non-Roma SW report poor knowledge of HIV transmission
Teira et al. (2010)	2, 3, 4, 5, 6	210 HIV-infected Roma and 4,252 non-Roma Spanish natives selected from network of clinics and hospitals	Cross-sectional, historical cohort study. Clinical records of treatment and diagnosis	Survival estimates for disease progression, first AIDS diagnosis, and death using Kaplan–Meier curves and Cox proportional hazards models	Kaplan–Meier curves compare Roma and non-Roma Spanish natives; significance of ethnicity coefficients in Cox models to determine disparity	Roma with HIV had quicker disease progression from HIV to AIDS, even after adjustment for prognostic variables, and less likely to receive ART prescription. High rates of HIV infection related to high rates of IV drug use

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Gyarmathy et al. (2008)	3	64 residents aged 18+ from a Roma neighborhood in Budapest, Hungary	Convenience sample, rapid assessment survey, 10-minute structured interviews, and blood tests (HIV, HAV/HBV/HCV antibodies, and syphilis)	Rates of infection, risk behaviors, and immunization evidence were reported	No comparison group; disparities not reported	No cases of HIV but high levels of HIV risk behavior, including drug injection, Hepatitis A, B, and C, and low Hepatitis B immunization
Kabakchieva et al. (2002)	2, 3, 5, 6	296 Roma men from Roma neighborhoods in Sofia, Bulgaria that were part of social networks of 54 socially active individuals	Survey elicited social network and risk behavior info. STD testing. Sociometric analysis software measured social status. Risk information from previously used scales	General linear models tested relationship between networks and sexual risk outcome measures. Stepwise regressions to assess predictors of STDs adjusting for other variables	Disparity not measured	Numerous risk factors identified (multiple partners, unprotected vaginal and anal intercourse). 22 % reported having at least one STD. The social network to which an individual belonged accounted for 23–27 % of variance in predicting sexual risk behavior
Kelly et al. (2006)	2, 3, 6	286 Roma men recruited as members of 52 distinct social networks in Sofia, Bulgaria	Randomized control trial: intervention leaders received HIV training; control group received brief 15 min session. Interview on risk behavior, drug and alcohol use; urine tested for STDs	Mixed effects linear and logistic regressions to test impact of social network intervention on risk behaviors	Disparity not measured	Social network intervention had positive impact on sexual practices relative to control, with change across numerous indicators of risk. Effects greatest among those with casual partners
Kelly et al. (2004)	2, 4	42 Roma men and women aged 18–42 in Sofia, Bulgaria and Budapest, and Kecskemet, Hungary	Purposively selected field sample, semi-structured interviews for sexual behavior, condom use, and knowledge about AIDS and STDs	Interviews independently analyzed by two raters to identify emerging themes; raters then developed taxonomy with decision trails and documentation	Disparity not measured	High incidence of sexual risk factors among Roma, including sexual freedom and acceptance of extradyadic partnerships; male Roma respondents report diverse taboo sexual practices and some abusive treatment of females
Other infectious disease						
Maduma-Butshe and McCarthy (2013)	1, 2, 3, 4	142 cases of measles identified over 4 years in three communities in England; majority of cases ($n = 90$) among Gypsy-travelers	Restrospective study of measles case management data collected between 2006 and 2009 among a population of approximately 2.2 million. Suspected cases were defined by positive measles IgM saliva test	Confimed cases of measles by county; data on date of case notification by county and suspected route of transmission in Gypsy-traveler communities reported	Disparity not measured	A majority (63 %) of cases identified over the 4-year surveillance period were confirmed among Gypsy-travelers, who comprised approx. 0.5 % of total population. Significant number of cases occurred among partially vaccinated individuals

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Casals et al. (2011)	1, 2, 6	192 men and 188 women followed from 1985 study conducted in Camp de la Bota, Barcelona, Spain	Retrospective cohort study of 1985 Roma TB outbreak. Registry data of: TB, communicable disease, drug users, insurance, penitentiary, and mortality	Kaplan–Meier and Cox proportional hazards models. Accounted for right censoring and left truncation in life expectancy analyses	Comparisons to rates of TB, AIDS, and mortality in Barcelona general population.	Roma had higher incidence of HIV, TB, intravenous drug use, imprisonment, and poorer survival rates. Family was an important factor influencing survival rates
Vantarakis et al. (2010)	2, 3	124 cases of Hepatitis A infection among Roma in three prefectures of NE Greece	Questionnaire collected clinical and epidemiological information. Surveillance data from public health authorities and serum samples used to monitor outbreak	Report on number of Hepatitis A cases and characteristics of infected individuals	Disparity not measured	Outbreak affected mainly Roma children aged <10 years. Inspection of Roma settlements showed that poor sanitary conditions were associated with HAV outbreak
Orlikova et al. (2010)	3	41 registered cases (35 Roma) in measles outbreak in Pulawy, Poland	Review of medical documentation from local health centers and ongoing reporting of new cases; lab confirmation and review of vaccination status	Unadjusted comparisons of rates (without tests for statistically significant difference)	Qualitative comparisons with non-Roma population	Low vaccination, infection transmission lasting after rash onset, questionable home isolation of cases, and numerous contacts inside the community contributed to outbreak among Roma
Gyarmathy et al. (2009)	2, 3, 5, 6	186 injection drug users in Budapest, Hungary	Recruited through street outreach and chain referral methods. Survey, blood and urine samples	Chi-square tests assessed unadjusted associations. Multivariate regressions to adjust for covariates	Coefficient on indicator of Roma ethnicity in multivariate regressions, adjusting for numerous covariates	Roma ethnicity was associated with Hepatitis A and C, having any drug-related infections, and having three or more drug-related infections
Hrivniaková et al. (2009)	2, 5	298 registered cases (297 Roma) in Hepatitis A outbreak in Slovakia	Surveillance statistics reported to public health authority	Report on number of Hepatitis A cases and characteristics of infected individuals	No disparity measured	Outbreak associated with low socio-economic conditions which facilitated person-to-person transmission. Outbreak contained to one village

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Child and adolescent health						
Bobakova et al. (2012)	2, 4, 6	330 Roma and 722 non-Roma youth in Slovakia	Comparative analysis of responses to individual interview (Roma) or self-administered questionnaire (non-Roma) on adolescent drunkenness (being drunk at least 1 time in past month), parental monitoring and peer influence (best friend's drinking behavior)	Logistic regression to test association between parental monitoring, peer influence and drinking behavior. Significance of interactions by comparing fit of models with and without interactions	Differences in the effect of parental monitoring, peer influence, and likelihood of being drunk adjusted for age, social desirability, and parental education attainment	Roma report more parental monitoring than non-Roma youth and are less likely to be influenced by peers. Parental behavior and peer influence drinking behaviors in all respondents; no difference detected in how principal variables contribute to likelihood of drunkenness
Kolarcik et al. (2012)	1, 2, 4, 5, 6	330 Roma nd 722 non-Roma in Slovakia	Cross-sectional study using data collected from individual interview (Roma) or self-administered questionnaire (non-Roma)	Chi-square for categorical and *T* test for continuous variables; regression analyses	Linear regression assessing association of ethnicity and psychosocial variables adjusting for gender, parental education and social desirability	Roma adolescents significantly more hopeless than non-Roma youths, but endorsed greater parental support and life satisfaction. Parental education mediated the relationship between Roma ethnicity and responses
Tsimaras et al. (2011)	1, 2, 3, 4, 6	180 children (60 in each group) aged 7–10 years in public schools in Northern Greece	Layer-type sampling of Greek, Roma minority, and Roma immigrant children. Test of gross motor development (reliable and validated scale)	One-way ANOVA tested main effect of ethnic group, post hoc tests assessed differences between groups in motor skills	Unadjusted comparisons between Greek, Roma, and Roma immigrant groups	Roma had significantly lower gross motor development, physical activity, and motivation from family for physical activity than Greek population, with no differences between Roma groups
Hujova et al. (2011)	1, 2, 3, 4, 6	174 Roma and 131 non-Roma children and adolescents aged 7–18 in central Slovakia	Physical examination (anthropometric; cholesterol, triglycerides) and survey data on CVD risk factors and smoking collected at pediatric health centers	Fisher's Exact test to evaluate relationship of CVD risk factors and lifestyle factors	Unadjusted comparisons of smoking prevalence (without tests for statistically significant difference)	Roma youth smoking prevalence more than twice that of non-Roma. Smoking Roma had higher mean rates of triglycerides, higher blood pressure, and changed blood serum lipid levels, which can lead to CVD
Spiroski et al. (2011)	3, 4, 6	501 Roma (229 1st grade, 272 5th grade) and 639 non-Roma (283 1st grade, 356 5th grade) from towns in Macedonia	Comparative case control study. Anthropometric data (height, weight, BMI)	Student's *t* test for association between defined characteristics and Pearson's Chi-square for association between independent samples	Unadjusted comparisons of height, weight, and WHO indices of height-for-age, weight-for-age, and BMI-for age	Health risks of Roma school children are predominantly related to underweight, while health risks of overweight or obesity are higher in non-Roma children

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Gerevich et al. (2010)	1, 2, 4, 5, 6	225 Roma and 182 non-Roma adolescents aged 13–16 in Hungary	Survey of segregated urban neighborhood high schools. Self-reported use of alcohol, smoking, and illicit drug use	Propensity score matched sample analyzed using random effects logistic model to account for nesting within school	Ethnicity indicator coefficient, after matching for age, gender, parental education, employment	Difference between Roma and non-Roma girls in smoking. Alcohol and illicit drug use was greater among Roma boys
Dostal et al. (2010)	1, 2, 3, 5, 6	66 Roma and 466 non-Roma children aged 0–6 years in Teplice, Czech Republic	Stratified random sample developed as part of another study on pregnancy outcomes. Self-report questionnaire and medical record	Multivariate regression models; negative binomial models	Rate ratios on ethnicity variable in gender-adjusted and multivariate models	Higher Roma rates of flu, bronchitis, intestinal infections, otitis media, pneumonia, viral diseases, and smoke exposure; lower birth weight and gestation length. Education accounted for bronchitis and pneumonia differences
Kolarcik et al. (2010)	1, 2, 4, 5, 6	330 Roma and 772 non-Roma elementary school students from 23 schools in Eastern Slovakia	In-school interviews. Health behaviors, social desirability, smoking, drinking, drug use, and physical inactivity	Chi-square for categorical and *t* test for continuous variables; logistic regression analyses	Unadjusted comparison of background characteristics; significance of ethnicity coefficient adjusting for gender, parental education, and social desirability	Roma ethnicity associated with lower rates of substance abuse, especially among girls. Physical inactivity rates only higher among Roma girls. Differences in parental educational level and sensitivity to social desirability had little effect
Janevic et al. (2010)	1, 2, 3, 4, 5, 6	1,192 Roma children aged 0–4 living in Roma settlements in Serbia	2005 Serbia Multiple Indicator Cluster Survey. Anthropometric measures for malnutrition (stunting, wasting, underweight)	Multiple logistic regression to relate family and child characteristics to the odds of stunting, wasting, and underweight	Disparity not measured	Wealth, maternal education, and having been left in care of another child were predictors for stunting. Living in urban settlement was strongest predictor for wasting
Hujova et al. (2010)	1, 2, 3, 4, 6	174 Roma children and adolescents aged 7–18 in 3 Central Slovakian cities	Physical examination (anthropometric; cholesterol, triglycerides) and survey data on CVD risk factors and smoking collected at pediatric health centers	*T* test, ANOVA, Mann–Whitney and Kruskal–Wallis evaluated distribution in gender, age, and geographic groups; Correlation coefficients	Disparity not measured	Geographic differences identified across range of CVD risk factors, including LDL and HDL cholesterol, total cholesterol, and triglycerides. Males had higher mean values for cholesterol, triglycerides, and blood pressure

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Alberty et al. (2009)	1, 2, 5, 6	535 Roma and 514 Caucasians aged 7 to 17 in Rimavska Sobota, Slovakia	Randomized survey of anthropometric data; cigarette smoking, physical activity; blood cholesterol and triglyceride	Unadjusted descriptive statistics and forward stepwise regression to identify anthropometric and behavioral factors correlated with cholesterol measures	Significance of *T* tests in unadjusted analyses and coefficients in multivariate models	Roma children had higher cholesterol (total, HDL, and LDL), were less physically active, smoked more, but had lower BMI and blood pressure. No differences in non-HDL cholesterol
Kanapeckiene et al. (2009)	1, 5, 6	90 Roma and 640 non-Roma children aged 9–19 in Vilnius, Lithuania, and Ventspils, Latvia	Anonymous questionnaire in two Roma schools and five non-Roma schools. Self-reported health behaviors and knowledge	Chi-square and *F* tests tested unadjusted differences between Roma and non-Roma children	Unadjusted differences considered to be disparity	No differences in any doctor visit; Roma children more likely to have ten or more doctor visits. Similar incidence of chronic conditions and presence and frequency of somatic symptoms
Hujová et al. (2009)	1, 2, 3, 4, 6	198 Roma and 140 non-Roma children aged 7–18 in three cities in Central Slovakia	Physical exam (anthropometric; cholesterol, triglycerides) and survey data on CVD risk factors and smoking collected at pediatric health centers	*T* test, ANOVA, Mann–Whitney and Kruskal–Wallis evaluated distribution in gender, age, and geographic groups; correlation coefficients	Tests of unadjusted differences by ethnicity using *t* test, ANOVA, Spearman, Pearson, and Fisher exact tests	Roma children had lower BMI, triglycerides, LDL-C, and HDL-C levels, higher mean systolic BP and lower mean diastolic BP. Higher incidence of CVD risk factors included smoking, lower physical activity, and low SES
Kolarcik et al. (2009)**	1, 2, 4, 5, 6	330 Roma and 772 non-Roma elementary school students from 23 schools in Eastern Slovakia	In-school interviews. Self-rated health, health complaints, healthcare utilization, mental health, and social desirability	Logistic and linear regressions; gender controlled in all analyses because of differences in sample composition	Significance of ethnicity coefficient and the degree to which SES and social desirability could account for ethnic differences	Roma children had poorer SRH, more accidents and injuries, and greater use of healthcare, but reported fewer health complaints. Parents' education markedly weakened the association of ethnicity with SRH and healthcare use
Michos et al. (2008)	2, 3, 5, 6	118 Roma and 98 non-Roma schoolchildren from proximal schools in a suburb of Athens, Greece	Voluntary parent survey of self-reported health status, health care; samples collected for Hepatitis A/B/C antibodies and antigens	Chi-square and Fisher Exact test to assess unadjusted differences in Roma and non-Roma; multiple logistic regression to assess differences in outcomes after adjustment for predictor variables	Unadjusted differences by ehtnicity and multiple logistic derived odds ratios of risk factors for HBV infection	98.3 % of Roma had detectable antibodies to HAV compared with 32.7 % of non-Roma. Roma children had high HBV infection prevalence and no prevalence found among non-Roma

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Monasta et al. (2008)	1, 4, 6	Roma children aged 0–5 years, from five settlements in Northern Italy	Survey and focus groups, purposely selected cluster sample of five Roma camps. Diarrhea, coughing, respiratory difficulties and wheezing, living conditions	Rates of health problems compared by length of time in settlement, access to a toilet with shower, and other housing conditions	Not measured; only looked at differences within Roma population	Roma had high rates of diarrhea, acute respiratory illnesses, and respiratory difficulties. Risk factors included living in camps for 5+ years, overcrowding, stagnating water, lack of access to a toilet with a shower, and presence of rats
Kaditis et al. (2008)	2, 3, 4, 5, 6	152 Roma children aged 5–14 years in Greece	Five schools in areas near Roma camps. Expiratory flow measured using spirometry equipment	*T* test to compare boys and girls; multivariate linear regression to adjust for covariables	Roma and Caucasian youth compared by *T* tests using prediction equations generated in previous study with Caucasians	Lung function of Roma children significantly lower than Caucasians. More Roma exposed to cigarette smoke, living in a tent without a sanitary system, and without electricity
Beach (2006)	1, 4, 5	Traveler children aged 0–16 in two sites and non-traveler children in two wards with similar deprivation indicator scores in Wales, England	Examination of All Wales Injury Surveillance System to compare rates of accident and emergency department use	Attendance rates reported and compared without using statistical tests	Differences in rates of attendance and reasons for accident and emergency department visits	Roma children more likely to have an Emergency Department visit. Attendance for burns was twice as high for Roma children
Maternal health and immunization						
Balázs et al. (2012)	1, 2, 3, 4, 5, 6	2,287 Roma and 5,469 non-Roma women reporting single live birth in 2009	2009 data from the Central statistical office (Hungary), biometric data from hospital admission records and a questionnaire which included questions about demographics substance use SES and housing conditions	Bivariate statistics of all variables in the study were conducted using Pearson's Chi-square and *t* tests. Analyses on the risk factors that could be associated with LBW or PTB used multivariable logistic regression	*T* tests to compare Roma and non-Roma populations	Roma mothers 2 times as likely to have LBW baby, but Roma ethnicity was not a significant correlate of LBW or PTB. Significant differences in risk factors for Roma mothers, such as smoking during pregnancy, being underweight, and wellbeing significantly more likely to have 3–13 children as compared to non-Roma women

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Stojanovski et al. (2012)	1, 3, 4, 6	468 Roma children (6–59 months) in Belgrade settlements in Serbia	The first Roma Health and Nutrition Survey in Belgrade settlements	Unadjusted odds examined association between vaccination card status, timeliness of vaccinations, and required dose by 17 months. Chi-square and Fisher exact tests assessed significance of unadjusted associations	Not measured; this study only examined vaccination rates among children in Belgrade settlements	Low rates of vaccination coverage reported—well below WHO targets; the mean rate for age appropriate full vaccination was 16 % for OVP and DTP, 14.3 % for MMR. Children with birth certificates were significantly more likely to have vaccination cards; 12 % of sample was unregistered with state
Pinkney (2012)	2	53 health visitors employed at one primary care trust in England as well as 20 women from the Gypsy and Traveling community	One questionnaire emailed to 53 employees at one PCT and a questionnaire completed with 20 Gypsy women at the clinic using the Iowa infant feeding attitude scale to assess maternal attitudes	Used a one-way ANOVA and the Kruskal-Wallis test	Disparity not measured	Low breastfeeding rate in the gypsy community observed. The maternal attitude toward breast feeding among Gypsy and Traveling community tended to be neutral, indicating no strongly held beliefs about early infant feeding.
Meghea et al. (2012)	2, 4, 6	914 pregnant women (Roma sample, $n = 33$) seeking antenatal care and/or confined to hospital-based bedrest in urban clinics in Romania	Cross-sectional study; data collected from the national Smoking during Pregnancy in Romania study. Self-reported smoking status utilized; covariates, including depression and perceived stress, assessed by PHQ-2 and PSS-4, respectively	Modeling and logistic regression to examine the influence of nesting within locations; logistic regression to test for differences between women confined or not to bedrest	Disparity not measured	Smoking rates are high among sample of Romanian women. Targeted interventions to raise awareness of risks of prenatal smoking are indicated, particularly among Roma women
Stefanoff et al. (2010)	3	102 Roma under the age of 20 in Pulawy, Poland	Measles vaccination, immunization records, and registration with primary health care centers	Simple reporting of rates of registration at municipality and vaccination	Disparity not measured	High number of Roma youth without measles vaccination. A number of Roma were not registered with the municipality and so did not have access to primary health care centers

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Rambouskova et al. (2009)	2 ,6	76 Roma and 151 non-Roma mothers with similar education. 2–4 days after delivery in a Czech Republic hospital	Food frequency questionnaire, maternal blood samples, physical measurements of infants and mothers	2-sample Wilcoxon test, Chi-square tests, and Fischer's exact tests	Disparity identified by relative risks; ANOVA used in multivariate analysis of newborn length, smoking, and smoking during pregnancy	Roma newborns were shorter and had lower birth weight. Roma women were more likely to smoke prior to and during pregnancy; consumed dietary supplements less frequently; had poorer diet
Kraigher et al. (2006)	1, 2, 3, 4, 6	436 Roma children aged 6, and 551 Roma children aged 16, in 3 regions of Slovenia	Retrospective comparison of vaccination coverage (from records and databases). Eligible children obtained from regional lists of Roma	Log-rank (Mantel-Cox) statistical test comparing vaccination rates (right censored) of pre-school and school-aged sample; unadjusted *T* test for comparison with national rates	Unadjusted comparison of vaccination rates for preschool aged Roma and Slovenia children	Vaccination coverage of preschool Roma children in Slovenia against polio, DTP, and MMR were significantly lower than the national coverage
Bobak et al. (2005)	1, 2, 3, 4, 5, 6	8,938 non-Roma and 1,388 Roma hospital births in Teplice and Prachatice, Czech Republic	Maternal questionnaire on health risk behaviors; hospital records on maternal height/weight, birth weight, gestational age	Ethnic differences in birth weight and gestational age measured through linear and logistic regression	Ethnicity indicator coefficient after matching for demographic and SES.	Roma infants had lower birth weight and shorter gestational age. Maternal education explained more than one-third and one-fifth of these respective differences, Controlling for covariates dramatically reduced ethnic differences in birth weight
Mandadzhieva et al. (2005)	2, 3, 5, 6	57 Roma and 153 non-Roma Bulgarian children ($\sim$10 years old) in Plovdiv, Bulgaria	Anthropometric data, measured cardiopulmonary exercise, perceived exertion; Parent-reported disease history and env/social factors	Unadjusted comparisons via *t* tests, Chi-square tests, and stepwise regression for multivariate comparisons	Tests of unadjusted ethnicity using *T* test, Fisher's exact test, correlation analysis, and stepwise regression ethnicity coefficients	Roma had lower birth weight and reduced lung function, but exhibited less perception of exertion. Birth weight correlated significantly with main anthropometric and cardiopulmonary parameters
Health behaviors						
Paulik et al. (2011)	1, 2, 5, 6	83 Roma and 126 non-Roma adults, aged 16–70 in Szeged, Hungary	Survey to assess smoking behavior, knowledge, and attitudes toward quitting and tobacco control	Chi-square compared groups; univariate and multivariate logistic regressions assessed effects of ethnicity	Tests of unadjusted differences and the significance of ethnicity coefficients in univariate and multivariate models	Smoking rates higher for Roma (72.3 %) than non-Roma participants (37.3 %). Support for tobacco control policy measures much higher among non-Roma population, explained only partially by lower levels of education

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Ekuklu et al. (2004)	1, 2, 3, 4, 5, 6	74 Roma and 517 non-Roma adults in Edime, Turkey	In-home interviews with random sample drawn from eight primary health care unit areas. Michigan alcoholism scanning test (MAST), survey of risk factors	Discontinuous variables compared via Chi-square; additional factors for alcoholism analyzed by stepwise logistic regression	Unadjusted comparisons using Chi-square tests; stepwise logistic regression	Prevalence of alcoholism 18.9 % among Roma population, 3.2 times higher than that among non-Roma. Within Roma population, alcoholism higher among smokers, those with employment income, and men
See also the following studies described above: Carrasco-Garrido et al. 2011; Voko et al. 2009; Jiménez-Sánchez et al. 2013; Hidvegi et al. 2011; Zeljko et al. 2008; Skaric-Juric et al. 2007; Kosa et al. 2007b						
Health service utilization						
McGorrian et al. (2012)	1, 2, 4, 5, 6	1,947 travelers in Ireland in 2008 and 2009	Community-based census survey of Irish traveler households. Collected data on usage of any health services in the past 12 months and used data from a previous consumer satisfaction survey of respondents in a free health care program	Used Chi-square to compare groups for descriptive statistics. Also used logistic regression for service quality variables	Compared groups through a Chi-squared test. Adjusted for age (traveler population was younger)	Travelers were more likely than those in the GMS program to have accessed general practitioners, hospital services, mental health and emergency services. Travelers also gave worse ratings to the range of health services, such as having less confidence and trust in accessing services compared to GMS program card holders
Idzerda et al. (2011)	1, 2, 3, 4, 6	17,375 individuals (World Bank), 4,582 individuals (UNDP), and 7516 women and 3,777 children (UNICEF) from Serbia	Household surveys, disaggregated by population (general, poorest, Roma); acute respiratory infection in children 0–5, use of primary healthcare services.	Pearson Chi-square test, post hoc Bonferroni test; measure of association between variables of the same theme using the Pearson's phi for nominal dichotomous data	Absolute and relative differences between the Roma and general population and the Roma and poorest quintile	Availability of health services not an issue disproportionately affecting Roma; however, personal documentation, geographic accessibility, and affordability disproportionately affect Roma. Cost of medications affected all three groups
Ekuklu et al. (2003)	1, 2, 5, 6	235 Roma and 654 non-Roma from 429 households in Edime, Turkey	Stratified random sample of households within the Muradiye health district; interviews on health services, and reasons and factors for use	Chi-square and non-parametric tests used to compare groups; factors influencing utilization of services assessed by stepwise logistic regression	Unadjusted comparisons and significance of ethnicity coefficients in regression analyses	Roma used health services more frequently over past 6 months; more likely to be without Green Card, less likely to be insured
See also the following studies described above: Carrasco-Garrido et al. 2011; Kolarcik et al. 2009; Peters et al. 2009; Janevic et al. 2012						

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Adult and infant mortality						
Blagojevic et al. (2012)	1, 2, 3, 4, 6	All inhabitants of Serbia from 1992 to 2007	Mortality rates for men and women of Roma and non-Roma. Mortality database from the statistical office of Serbia. Classified causes of death according to the ICD	Compared the number of observed winter deaths to the number of expected winter death based on an April–July index	Difference between the Roma and the rest of the population	Both Roma and non-Roma populations in Serbia have high rates of winter mortality as compared to other countries in Europe. The Roma population has a much higher seasonal variation in mortality, with most of the deaths attributed to respiratory diseases
Rosicova et al. (2011b)	1, 2, 3, 4, 5, 6	All inhabitants of Slovakia in 2004	Infant mortality data compared across 79 districts and correlated with district-level education, unemployment, income and percent Roma. Slovak statistical office	Linear regressions to describe associations between mortality and other variables	Roma ethnicity coefficient in linear regressions	Proportion living in Roma settlements associated with infant mortality, even after adjustment for SES
Kohler and Preston (2011)	1, 2, 3, 4, 5, 6	All non-institutionalized adults aged 20+ in Bulgaria from 1992 to 1998	Longitudinal census and mortality data for men and women were compared across ethnic/religious groups	Non-parametric piecewise-constant hazard models in which the death rate was modeled as a function of age and a series of covariates at the individual level	Unadjusted difference between ethnicities and multivariate analyses accounting for age, SES, and patterns of immigration	Muslim and Christian Roma experience highest mortality and lowest mean age at death among all groups and years. Disparity applies to nearly every cause of death and is not entirely explained by SES variables
Molnar et al. (2011)	1, 2, 3, 5, 6	60 Roma and 1,003 non-Roma patients aged 18+ at single kidney transplant outpatient clinic in Budapest, Hungary	Cohort study of kidney transplant patients between 1977 and 2002. Medical and lab data collected prospectively at baseline	Chi-square assessed categorical variables, continuous variables assessed by *T* test, ANOVA, Mann–Whitney and Kruskal–Wallis; Cox regression analysis to assess the association between ethnicity and mortality	Unadjusted differences between ethnicities and multivariate analyses accounting for age, gender, and medical history	Roma ethnicity is independently associated with increased mortality risk as well as worse graft outcome in kidney transplant recipients
Rosicova et al. (2009)	1, 3, 4, 5, 6	All inhabitants of Slovakia age 20–64 years in the year 2002	Mortality data compared across 79 districts and correlated with district-level education, unemployment, income and percent Roma. Slovak statistical office	Linear regression analysis and Spearman correlations to describe associations between mortality and other variables	Significance of Spearman tests between ethnicity and mortality; ethnicity coefficient after adjustment for education, unemployment, and income	No difference between Roma and non-Roma on mortality rates among 20 to 64-year-olds, with or without adjustment for other SES variables

Table 1 continued

References	Quality checklist	Sampled population	Study design and instrument	Statistical analysis	How was disparity measured?	Results (disparity from mainstream population)
Bogdanovic et al. (2007)	1, 2, 3, 4, 6	All inhabitants of Serbia in 2002 and 2005	Mortality rates for men and women of Roma and non-Roma. Mortality database from census	Chi-square analyses by ethnic group and over time; Mann–Whitney U test to compare average age of death	Unadjusted difference between Roma and non-Roma population	Mortality higher for Roma in Serbia than non-Roma counterparts. Roma significantly more likely to die of respiratory illnesses and less likely to die of CVD

Criteria for quality checklist

(1) Sample selected was something other than a convenience sample to reduce sample selection bias and allow for generalizability to a larger population; (2) clear description of methods used to collect, analyze data, and assess disparities; (3) attempts made to establish non-self reported/objective assessment of the data; reliability and validity of the data; (4) sampled from multiple sites/communities/localities (rather than one site) to increase sample representativeness; (5) attempt to control for confounding by socioeconomic status or need; and (6) sufficient sample size and standard errors accurately reported

** These articles cover multiple areas of health and are repeated in two different locations of the table

Non-communicable disease and chronic illnesses

Multiple studies reported that Roma have higher rates of non-communicable disease and chronic illnesses than non-Roma. However, conclusions should be approached cautiously since only two of fourteen studies on non-communicable disease met five methodological criteria (Jiménez-Sánchez et al. 2013; Vozarova de Courten et al. 2003). The remaining studies were limited by a large non-response rate (Zivkovic et al. 2010), inadequate sample sizes (Dorkova et al. 2010; Majdan et al. 2012), convenience sampling (Kolvek et al. 2012; Molnar et al. 2011; Zeljko et al. 2012), and no adjustment for confounders (Dorkova et al. 2010; Hidvegi et al. 2011; Krajcovicova-Kudlackova et al. 2002, 2004).

Studies of diabetes risk in southern Slovakia, Serbia, and Hungary found higher rates among Roma than in the general population (Hidvegi et al. 2011; Vozarova de Courten et al. 2003; Zivkovic et al. 2010). Roma in these areas were also more likely to have abdominal obesity and overweight status, with incidence as much as 2.5 times that of the non-Roma group (Dorkova et al. 2010; Krajcovicova-Kudlackova et al. 2004; Zivkovic et al. 2010). Higher rates of obesity were reported among Roma compared to the general population in studies set in Croatia (Zeljko et al. 2008), Italy (Gualdi-Russo et al. 2009), and among Roma women in Spain (Carrasco-Garrido et al. 2011). Roma appeared to be at higher risk of poor nutrition in Slovakia (Krajcovicova-Kudlackova et al. 2004), while a study in Croatia found no difference in nutritional status (Skaric-Juric et al. 2007).

Studies reported higher blood pressure among Roma compared to non-Roma (Gualdi-Russo et al. 2009; Krajcovicova-Kudlackova et al. 2004), while rates of hypertension were lower (Zeljko et al. 2008). Roma also had significantly higher rates of obstructive sleep apnea, although this finding was based on a limited sample size (Dorkova et al. 2010). In Slovakia, Roma patients had a significantly higher prevalence of end stage renal disease compared to the general population (Kolvek et al. 2012). In a study meeting all six methodological criteria, Roma women were 1.56 times more likely to suffer from migraine headaches (Jiménez-Sánchez et al. 2013).

HIV/AIDS

Only one of seven studies on HIV/AIDS met five methodological criteria for rigor (Teira et al. 2010). Major weaknesses in these studies were convenience sampling and inadequate adjustment for potential confounders (Gyarmathy et al. 2008; Kabakchieva et al. 2002; Kelly et al. 2004, 2006; Sipetic et al. 2012). Two studies in Spain and one in Hungary suggested that Roma are at high risk for

contracting HIV and less likely to receive adequate HIV treatment than their non-Roma counterparts (Casals et al. 2011; Gyarmathy et al. 2008; Teira et al. 2010). The most rigorous study, from Spain, found that Roma HIV patients progressed more quickly from HIV to AIDS, and were less likely to receive antiretroviral therapy (ART) (Teira et al. 2010). Roma also demonstrated high rates of behaviors that placed them at risk for HIV infection, including intravenous (IV) drug use (Casals et al. 2011; Gyarmathy et al. 2008; Teira et al. 2010). Roma sex workers in Serbia did not differ significantly from non-Roma sex workers in regard to risk behaviors, but all had very poor knowledge of HIV transmission and reported high daily use of substances (Sipetic et al. 2012). Three studies attempted to improve understanding of sexual behavior practices among Roma. Though none measured disparities with the general population and their generalizability was limited, findings suggest limited knowledge of HIV risk factors and high risk sexual behaviors (including casual and multiple concurrent partnerships), particularly among Roma men (Kabakchieva et al. 2002; Kelly et al. 2004) and sex workers (Sipetic et al. 2012). A study of Roma youth (aged 15–24) in Serbia found higher rates of sexually transmitted infection and risky sexual behaviors (Djonic et al. 2012).

Other infectious disease

No studies in this category met five methodological criteria; most met three or fewer of these criteria. Common weaknesses included use of convenience sampling (Gyarmathy et al. 2009; Vantarakis et al. 2010), limited sample size (Orlikova et al. 2010), and confinement of studies to a single community or locale (Casals et al. 2011; Hrivniaková et al. 2009; Orlikova et al. 2010). The available evidence, while limited, is suggestive that Roma communities may be particularly vulnerable to outbreaks of infectious diseases because of low vaccination rates and crowded, unsanitary housing conditions (Bogdanovic et al. 2007; Molnar et al. 2010). Studies documented multiple disease outbreaks including hepatitis (Gyarmathy et al. 2009; Hrivniaková et al. 2009; Vantarakis et al. 2010), measles (Kojouharova et al. 2003; Maduma-Butshe and McCarthy 2013; Orlikova et al. 2010), and polio (Kojouharova et al. 2003). One study found Roma in Spain had higher incidence of tuberculosis compared to the general population (Casals et al. 2011).

Child and adolescent health

Eleven of eighteen children's health studies met at least five methodological criteria. A survey of 0- to 2-year-olds in the Czech Republic found higher rates among Roma of influenza, acute bronchitis, intestinal infections diseases, otitis media, pneumonia, and viral diseases (Dostal et al. 2010). A study of Roma children aged 5–14 in Greece found significantly reduced lung function compared to non-Roma youth (Kaditis et al. 2008). A similar study in Italy found high rates of diarrhea, acute respiratory illness, and respiratory difficulties among Roma youth age 0–5 (Monasta et al. 2008). While the latter study did not have a non-Roma comparison group, results showed that living in camps for more than 5 years, overcrowding, stagnating water, and other poor housing and living conditions increased risk for these illnesses among the Roma sample.

Regarding youth cardiovascular disease (CVD) risk factors, researchers found that Roma in Slovakia had lower HDL cholesterol and higher systolic blood pressure than non-Roma participants (Hujova et al. 2010); however, these findings were not replicated in a less-rigorous Slovakian study (Alberty et al. 2009). Smoking was strongly associated with multiple CVD risk factors (Hujova et al. 2011). Significantly higher rates of cigarette smoking were consistently identified among Roma youth compared to non-Roma youth (Alberty et al. 2009; Gerevich et al. 2010; Olivan 2002), as well as increased environmental exposure to tobacco smoke (Dostal et al. 2010). Lower physical activity among Roma youth was identified in multiple studies (Alberty et al. 2009; Hujova et al. 2010; Tsimaras et al. 2011) as well as lower motivation from family for physical activity (Tsimaras et al. 2011). Low body mass and malnutrition were also identified as a concern for Roma youth (Hujová et al. 2009; Janevic et al. 2010; Spiroski et al. 2011) with lack of wealth, maternal education, and living in an urban settlement identified as contributing factors (Janevic et al. 2010).

In Slovakia, Roma youth reported poorer self-rated health, more accidents and injuries, and greater health care use in the past year than non-Roma respondents (Kolarcik et al. 2009). Roma youth also reported significantly higher rates of hopelessness, but higher levels of parental support and greater life satisfaction than non-Roma youth (Kolarcik et al. 2012). A companion study found lower rates of substance abuse reported for Roma, especially among girls (Kolarcik et al. 2010). This was not consistent with higher rates of self-reported alcohol use and illicit drug use found among Roma adolescents in Hungary (Gerevich et al. 2010). Roma adolescents reported more parental monitoring and were less likely to be influenced by peers than non-Roma adolescents in Slovakia, both factors which affect drinking behaviors (Bobakova et al. 2012).

Health behaviors

Research on health behaviors was generally well developed, with five of nine studies meeting at least five methodological criteria (note that many of these studies are

summarized under other categories in Table 1). High smoking rates among Roma adults are a particular concern (Kosa et al. 2007; Krajcovicova-Kudlackova et al. 2004; Paulik et al. 2011; Skaric-Juric et al. 2007; Voko et al. 2009; Vozarova de Courten et al. 2003; Zeljko et al. 2008), with smoking prevalence twice that of the general population in both Hungary (72 and 37 %) (Voko et al. 2009) and Slovakia (42 and 21 %) (Vozarova de Courten et al. 2003). Results from studies of alcohol consumption were mixed. Roma women in Spain reported higher rates of alcohol consumption than non-Roma women (Carrasco-Garrido et al. 2011). In Hungary, the prevalence of moderate to heavy drinking among Roma was not significantly different from non-Roma (Kosa et al. 2007) and revealed a higher rate of abstinence from drinking among Roma compared to non-Roma. On the other hand, in a rigorous study in Turkey, the prevalence of alcoholism was 3.2 times higher than the non-Roma population and these higher rates persisted regardless of income status (Ekuklu et al. 2004).

A pair of studies in Hungary identified significant differences in diet, even after controlling for education, employment, and income, with Roma reporting consumption of fewer fruits and vegetables, and more likely to use animal fat (versus vegetable oil) for cooking (Kosa et al. 2007; Voko et al. 2009). Roma in Slovakia likewise reported a diet high in fat, cholesterol, and animal protein, as well as reduced intake of key nutrients, and lower levels of physical activity (Krajcovicova-Kudlackova et al. 2004; Vozarova de Courten et al. 2003).

Health services utilization

Studies examining utilization of health services were rigorously conducted, with six of seven studies meeting at least five methodological criteria (many of these studies are summarized under other categories in Table 1). The findings suggest differences both in use (Carrasco-Garrido et al. 2011; Ekuklu et al. 2003; Kolarcik et al. 2009) and type of health services used (Beach 2006; Ekuklu et al. 2003; McGorrian et al. 2012; Peters et al. 2009), as well as barriers to care (Idzerda et al. 2011; Janevic et al. 2012; McGorrian et al. 2012). Roma in England were less likely than non-Roma Whites to visit the chiropodist, dentist, practice nurses, NHS Direct, and to be registered with a General Practitioner (Peters et al. 2009). Roma women in Spain used preventive services less often, including mammography and Pap smear testing (Carrasco-Garrido et al. 2011). In Turkey, Roma used health services more frequently than non-Roma, but were significantly more likely to use primary health center services versus more specialized services, reflecting lower insurance coverage and reduced access to other health care options (Ekuklu et al. 2003). In Serbia, lack of documentation, as well as accessibility and affordability of care disproportionately impacted Roma health care use (Idzerda et al. 2011). In Ireland, despite higher reported rates of access to care, Roma showed less trust in health services and reported less favorable ratings of these services (McGorrian et al. 2012). In Slovakia, higher rates of health care utilization were identified among Roma youth compared to non-Roma, perhaps as a result of higher rates of accidents and injuries (Kolarcik et al. 2009).

Maternal health and immunization

Only three of nine studies on maternal health met five criteria for methodological rigor. Multiple studies found Roma/non-Roma disparities in prenatal care and pregnancy outcomes. The most rigorous study from Czech Republic found that 14 % of Roma newborns had low birth weight, compared to 4 % of non-Roma newborns. Maternal education was the largest contributor to both low birth weight and shorter gestational age, while behaviors (smoking, drinking) had a relatively modest effect (Bobak et al. 2005). In Slovakia, the proportion of people living in Roma settlements was a significant contributor to perinatal and infant mortality, even after adjusting for socioeconomic factors (Rosicova et al. 2011b).

Methodological limitations in other studies included convenience sampling, small samples, no information on reliability of measures, and no adjustment for potential confounders (e.g., Mandadzhieva et al. 2005; Meghea et al. 2012; Pinkney 2012; Rambouskova et al. 2009). With these limitations in mind, these studies found that Roma mothers had lower birth weight babies (Balázs et al. 2012; Mandadzhieva et al. 2005; Pelzer Moukagni et al. 2011; Rambouskova et al. 2009), lower prenatal nutrition, higher rates of smoking during pregnancy (Balázs et al. 2012; Meghea et al. 2012; Rambouskova et al. 2009), and lower rates of breastfeeding, with one study finding only 3 % of Roma mothers choosing to breastfeed at birth (Pinkney 2012). Evidence also suggested that Roma women were nearly twice as likely to report a miscarriage or to lose one of their offspring (Parry et al. 2007).

Immunization rates were lower among Roma with only 51 % of youth aged 20 or under having completed measles immunization in Pulawy, Poland (Stefanoff et al. 2010). One rigorous study of vaccination records in Slovenia found that vaccination coverage among preschool aged Roma was significantly lower than the national level (Kraigher et al. 2006). Low rates of vaccination were also reported for children in Serbia (Stojanovski et al. 2012).

Mortality and life expectancy

While only six studies were identified with respect to mortality risk and life expectancy of Roma, all were

methodologically rigorous and all indicated higher mortality risk for Roma versus non-Roma populations. In the adult Bulgarian population, Roma men and women experienced the highest mortality and lowest mean age at death among all groups and years (Kohler and Preston 2011). The excess mortality applied to nearly every cause of death examined and persisted after adjustment for social and economic variables. In another study in Serbia, Roma were more likely than non-Roma to die of respiratory illness, especially in winter (Blagojević et al. 2012), and less likely to die of cardiovascular disease, although there was no adjustment for socioeconomic factors (Bogdanovic et al. 2007). Roma women in Serbia also had a mortality rate twice that of non-Roma women. Finally, Roma ethnicity was independently associated with increased mortality risk as well as worse graft outcome among a sample of kidney transplant recipients (Molnar et al. 2011).

Discussion

The evidence base on Roma health and disparities is expanding. In their review from 2000, Hajioff and McKee (2000) observed that 70 % of Roma health papers originated from Spain, the Czech and Slovak Republics, and Hungary. By contrast, fewer than half of the studies in the current review were drawn from these four countries, with a high proportion fielded in the UK, Serbia, Croatia, Bulgaria, Romania, and Turkey. Research priorities have shifted with the majority of publications after 2003 reporting on self-rated health, non-communicable disease, and child and adolescent health. Over half (42 of 75) were published between 2010 and 2012. This increase in breadth and number of Roma health studies may in part be attributed to the decade of Roma inclusion 2005–2015 initiative and the priority that it has placed on improving Roma health (European Union 2008).

A significant proportion of studies on Roma health (33 out of 75) met at least five of six criteria for methodological rigor. Among them, we found substantial evidence that Roma have lower self-reported health status (Janevic et al. 2011, 2012; Peters et al. 2009; Skodova et al. 2010; Voko et al. 2009) and significantly higher mortality risk (Blagojević et al. 2012; Bogdanovic et al. 2007; Kohler and Preston 2011; Rosicova et al. 2011a; Rosicova et al. 2009).

There was considerable evidence of greater health risk factors for Roma children including higher rates of smoking (Gerevich et al. 2010; Hujova et al. 2010), poorer living conditions (Kaditis et al. 2008), more exposure to tobacco smoke (Dostal et al. 2010; Kaditis et al. 2008), less physical activity (Hujova et al. 2010; Tsimaras et al. 2011), more accidents and injuries (Kolarcik et al. 2009), and poorer nutrition (Kaditis et al. 2008). Low birth weight (Bobak et al. 2005) and lower vaccination coverage (Kraigher et al. 2006) additionally contribute to increased risk of poor health outcomes. Protective factors were also identified among Roma youth including higher levels of parental support (Kolarcik et al. 2012), greater parental monitoring than non-Roma youth (Bobakova et al. 2012), and greater life satisfaction (Kolarcik et al. 2012), factors that may have reduced the prevalence of substance abuse (Kolarcik et al. 2010) and alcohol use (Bobakova et al. 2012) among Roma youth. Efforts from the international community focusing on Roma youth have largely focused on education, nutrition, early child development, and maternal health programs. While critically important, this review also suggests a need for directing resources towards smoking prevention and health education programs, and improving social and environmental factors such as living conditions that increase exposure to risk factors.

Although employing rigorous methodologies, some findings of Roma health are based only on a single study. Among these are findings that Roma are more likely to die of respiratory illness and less likely to die of cardiovascular disease (Bogdanovic et al. 2007), and have higher youth rates of gastro-intestinal and respiratory illnesses (Dostal et al. 2010). For Roma adults, health concerns include higher prevalence of obesity (Carrasco-Garrido et al. 2011; Vozarova de Courten et al. 2003), high rates of IV drug use, lower rates of ART prescription, quicker progression to AIDS (Teira et al. 2010), and, among Roma women, higher rates of depression (Carrasco-Garrido et al. 2011). Reduced health prevention and access to care may contribute to Roma health disparities (Carrasco-Garrido et al. 2011; Peters et al. 2009) with a number of barriers identified including lack of documentation and affordability of care (Idzerda et al. 2011).

A number of studies suggest Roma disparities in chronic disease including diabetes and apnea, and CVD risk factors including poor diet and high blood pressure, but these findings have methodological limitations. Similar limitations were found in studies of infectious disease, including HIV/AIDS, hepatitis, measles, polio, and tuberculosis. Despite the expansion of Roma health research, the difficulty of conducting studies with meaningfully representative samples and proper comparison groups persists. Furthermore, prevalence of a number of illnesses such as mental health, cancer, and asthma, has yet to be studied among Roma adults.

Challenges to improving Roma health include both understanding needs specific to this population, as well as increasing successful participation of Roma in health systems in their country of residence. Successful initiatives must center on providing the Roma with a sense of belonging, as full citizens of their host country, providing a considerate approach to the processes of selective

acculturation and aiming to encourage full participation in education, housing, health service uptake and employment. Increased visibility of Roma in policies, strategies and initiatives, and continued implementation of the Decade objectives is a necessary step toward achieving these goals.

In the racial/ethnic disparities literature in the United States, momentum has shifted away from describing disparities, and toward conducting and evaluating interventions to reduce disparities (Lurie et al. 2005), with a sufficient number of published disparities intervention studies in diabetes and cardiovascular care to merit systematic reviews (Arblaster et al. 1996; Glazier et al. 2006; Jones et al. 2010). By contrast, the Roma health disparities literature has not yet moved towards testing and evaluating health interventions. Two exceptions worth noting are (1) an intervention among Roma men in Bulgaria, which found that training social network leaders was more successful at increasing knowledge of HIV risk behaviors (Kelly et al. 2006); and (2) an intervention in Hungary with qualitative data suggesting that relocation of families from camps into permanent housing led to improved mental health, decreased infectious disease, ill health, disability, and mortality (Molnar et al. 2010). More evaluated interventions are needed to improve the tools available to policymakers and increase understanding of the underlying causes of Roma/non-Roma disparities.

There are limitations to this systematic review. By not including studies from non-English journals, we excluded articles of importance, written by researchers with closer linguistic ties to the Roma in their country. By not including qualitative studies, we chose to focus on the generalizability of findings among the Roma and the state of empirical quantitative work. However, this omission excludes a number of articles that provide in-depth analysis of the barriers to health and health services faced by the Roma. Criteria for assessing methodological rigor were adapted to be appropriate to studies of Roma disparities and to be concise enough to be easily understood and compared across the 75 studies that were reviewed. This type of coding scheme does not allow for a detailed examination of the methodological rigor of these studies (i.e., fit of regression models, non-response rate, validity of interpretation). Coder disagreement, though rare, points to the inherently subjective nature of the assessments. People of Roma ethnicity represent a diverse group, differing broadly across European countries in terms of language, customs, ethnic self-identification, and preferences for residential stability, which complicates cross-study comparisons. However, the ethnic group shares many common features, including their relatively low socioeconomic status compared to non-Roma and their greater likelihood to live at the margins of European political and social systems. Nearly all of the studies reviewed were confined to one or at most two European countries. While these findings may not be generalizable across Europe, they do shed light on areas that national and local government and NGOs should be aware of when allocating resources to improve Roma health.

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