The aim of this thesis was to explore the association between Roma ethnicity and the outcomes of coronary artery disease (CAD) in patients undergoing coronary angiography (CAG). First, this thesis focused on the relationship of Roma ethnicity, medical risk factors and the severity of CAD at entry to cardiologic care compared with non-Roma. Next, it assessed ethnic differences in mortality after treatment and changes in clinical status, health behaviour and self-rated health (SRH) over the follow-up period. Furthermore, this thesis aimed to provide an explanation of ethnic differences in all-cause mortality in patients after CAG and looked for effects of Roma ethnicity on mortality and SRH.

In this final chapter the main findings will be summarized (8.1) and discussed within the context of the current status in the field of interest (8.2). Next, the strengths and limitations of the thesis will be addressed (8.3). Finally, the chapter will be completed with implications for practice and recommendations for future research (8.4).

8.1 Main findings

Research question 1 Do Roma coronary heart disease patients have more medical risk factors and greater severity of coronary heart disease than non-Roma?

Roma patients had significantly more risk factors and more severe types of coronary heart disease (CHD) at entry to cardiologic care than non-Roma. They were treated less frequently with statins and beta-blockers and were more frequently left on pharmacotherapy and surgically revascularized. These differences remained after controlling for education, gender and age. Thus, Roma CHD patients have a worse risk profile at entry to care and seem to be under-treated in the period before entry compared with non-Roma CHD patients.

Research question 2 What is the seven years’ mortality in Roma and non-Roma patients after coronary angiography?

The seven years’ all-cause mortality after CAG was significantly higher among Roma than among non-Roma, and differences decreased only partially after adjustment for educational level, gender and age. Thus, the higher mortality after CAG among Roma can only partially be explained by the lower socioeconomic status of this minority.
Research question 3 What causes the difference in eight years’ mortality of Roma and non-Roma patients after coronary angiography?
The eight years’ all-cause mortality after CAG was significantly higher among Roma than among non-Roma after adjustment for age, gender, education, severity of the CAD and type of treatment. Among the medical factors associated with increased risk of death in Roma patients, the highest risks concerned functional classes NYHA III or IV. The excess of Roma mortality after CAG can be partially explained by their lower education and worse clinical status.

Research question 4 Does poorer self-rated health mediate the effect of Roma ethnicity on mortality in patients with coronary artery disease after coronary angiography?
We found that both Roma ethnicity and poor SRH were predictors of increased nine years’ all-cause mortality in patients with CAD, also adjusted for differences in educational level. Poor SRH did not mediate the higher mortality among Roma CAD patients. Roma patients with a poor SRH thus have a significantly increased risk of dying after CAG.

Research question 5 What are the changes in clinical status, health behavior and self-rated health after coronary angiography in Roma and non-Roma coronary artery disease patients?
We found no significant differences in improvement after CAG of clinical status, health behaviour and SRH between Roma and non-Roma, except for triglycerides and diastolic blood pressure. The higher mortality after CAG in Roma CAD patients is therefore mainly not due to less improvement of their clinical status, health behaviour and SRH after CAG. Their outcomes may in particular be improved by enhancement of their access to health care earlier than when it comes to CAG.

8.2 Discussion of the main findings
The main findings will be discussed within the framework of the general aims, as outlined in the model in Chapter 1. Our main findings are summarized in Figure 8.1.

Figure 8.1 Model of the relationships examined in the thesis and findings on these, regarding CAG referred patients

We found ethnic differences in the outcomes of CAD patients after specialized cardiologic care at the disadvantage of Roma. This might be due to either a poorer health status at entry or to less improvement after entry into care, including differences in the quality of the treatment, or their combination.

Regarding the poorer outcomes of Roma, one of our main findings is a higher all-cause mortality in Roma CAD patients (1), which is in line with previous studies that found a generally higher mortality in the Roma population (2-6). Differences were found in the mortality among other ethnicities, as well (7,8). Borrell et al. observed the mortality to be lower among Hispanic women than among non-Hispanic white women (9). On the other hand, Feder et al. did not find any difference in mortality between south Asian and white participants among patients appropriate for revascularization, though South Asians were less likely to receive CABG (10). Van Oeffelen showed a decline in the incidence of acute myocardial infarction in all ethnic groups, except in Turkish women and Moroccan men in the Netherlands during the past decade (11,12). Differences in the incidence of the medical risk factors of CAD among various ethnicities were found as well, mostly at the disadvantage of the ethnic minority groups (13,14). Regarding the higher mortality in Roma, most studies were rather descriptive and did not look further into the pathways leading to this increased mortality. Such an increased mortality
of Roma may in general be due to a higher incidence of underlying diseases, a higher mortality (lethality in case of those diseases), or both. We here in particular assessed the lethality in CAD patients.

We found no major differences in outcomes of treatment between Roma and non-Roma, suggesting that poorer quality of treatment mostly does not explain the higher mortality of Roma after CAD treatment. In particular, we looked at changes in the health status and SRH of Roma and non-Roma patients during the treatment process after CAG. We found no ethnic differences in improvement of the health status and SRH in Roma CAD patients after CAG when compared with non-Roma. This suggests that the beginning of these differences fully lies before entry into the health care process. Poorer treatment of Roma patients, e.g. because of discrimination during the treatment process, is thus unlikely, at least as far as treatment outcomes are concerned. However, adherence to treatment in Roma patients is generally poorer than in non-Roma; e.g. Roma are frequently unwilling to quit smoking even though they have a diagnosed CAD. Despite this lower adherence, their treatment outcomes do not differ that much from the outcomes of non-Roma, so this poor adherence does not seem to play an important role in Roma CAD patients.

A second pathway leading to poorer outcomes after CAD would be poorer health status at entry to care. We found as support for this pathway that Roma patients entering specialized cardiologic care did indeed have worse health status when compared with their non-Roma counterparts (15). Roma had on average a worse risk profile, which has been described in other studies as well (16-25). This is undoubtedly one of the main contributing factors for their later poorer outcomes when compared with the non-Roma majority population. Similar findings concerning health status of Roma with chronic kidney disease were described by Kolvek (26,27) and Rosenberger (28). This shows that the health status of Roma at entry to care indeed deserves further research on its causes.

One of the reasons for this poorer health status at entry to cardiologic care might be the low socioeconomic status (SES) of Roma. They have a mostly low educational level and rates of long-term unemployment among them are high. Moreover, many Roma, especially those residing in segregated settlements, live in bad housing conditions and practice poor nutrition. They have limited financial means for transportation, which may also limit their access to health care (29-31). Some authors have declared that this poor SES is the only cause of their bad prognosis (32). However, we found that even after adjustment for age, gender and education, Roma had a more than two-times higher risk of dying after CAG. This indicates that SES, as far as captured by low education, explains only a part of the higher mortality of Roma. The delayed access to care, which seems to occur at the stage in the care-seeking process, contributes most to the increased mortality.

Another cause for the poorer health status of Roma at entry to cardiologic care may concern delays in their access to adequate health care because they experience barriers in the health care system (33,34). This may be due to the lower educational level of the Roma population combined with lower health literacy in particular. Another issue closely attached to this is the attitude of Roma towards their own health. Studies comparing Roma and non-Roma showed that Roma perceive the relationship between lifestyle and health much less as being strictly causal (35,36). Roma usually look for health care when they are in much worse health status than non-Roma, and they are generally less willing to be hospitalized due to their cultural beliefs (29). The resulting longer delay between symptom onset and treatment among Roma may decrease their survival.

We found SRH to be a predictor of increased mortality in all CAD patients, including Roma, thus confirming previous findings in CAD patients (37). On average, Roma have poorer SRH (38-42); however SRH does not mediate this higher mortality in Roma CAD patients. Thus, the combination of Roma and poor SRH may be used to identify patients most at risk of mortality.

8.3 Strengths and limitations

The strengths of the present study are its relatively high response rate at baseline, recruitment from a full catchment area, i.e. the east Slovakian region, and the large sample of Roma patients with CAD, which is unique in this field of research. Another strength of the study is that besides cross-sectional data we also obtained longitudinal data. Regarding mortality, we had a long observation period of up to nine years and a very low loss to follow-up. This allowed us to assess factors associated with increased Roma mortality in comparison with non-Roma mortality more precisely.

However, in interpreting our results one has to consider certain limitations. A first limitation is the assessment of Roma ethnicity, which was based on each patient’s declaration and identification by the doctor, which could be biased. Some Roma do not declare themselves as Roma, but as Slovak or Hungarian. We tried to solve this problem by using a third opinion from a head-nurse for all patients, but this procedure may have missed some instances of misclassification of ethnicity. If so, that will probably have led to an underestimate of the real effects.

Another limitation was the lack of information on the exact cause of death in patients, making it impossible to distinguish between cardiac and non-cardiac mortality. Ethnic differences in these patients are probably most pronounced for the former category. Other diseases like infectious diseases and chronic obstructive pulmonary disease might influence the mortality in Roma patients as well. Moreover, socioeconomic status
disease and could improve the prognosis of these patients. Finally, access
needed. Better early detection could prevent future complications of the
high-risk Roma population, with initiation of earlier treatment when
might warrant a screening for basic cardiovascular risk factors in this
Our finding of a poorer cardiovascular status at entry to cardiologic care
by increasing the educational level and decreasing unemployment (29,30).
improvement of the socioeconomic status of the whole Roma population
of an out-patients visit. A wider and more complicated issue is, of course,
transportation free of charge, which is already available in all acute cases,
SRH and may be easily implemented in routine practice.
8.4 Implications for clinical practice and policy, and for future
research
We found that Roma patients had a poorer health status at entry to
cardiologic care, which implies first, that clinicians should be aware of
this poorer average health status and adapt their health care process to it.
Second, general practitioners, cardiologists and physicians treating Roma
patients with CAD should be aware of the ethnic differences in the basic
risk profile and outcomes of these patients. These facts should urge them
to refer Roma patients for diagnostics and adequate treatment of CAD
earlier than they do at present. Initiatives like Roma health assistants,
who are already working in segregated Roma settlements (29), might
counteract the effect of low health literacy in the Roma population and
explain to Roma patients how to influence the main risk factors of CAD
by changing their lifestyle.

Another implication for practice from our study is that SRH could be
used as a simple predictor of mortality in Roma CAD patients at the time
of CAG. This could draw further attention to Roma patients with poor
SRH and may be easily implemented in routine practice.

Health policy makers might consider measures aimed at
improving the access of Roma patients to the health care system, such as
transportation free of charge, which is already available in all acute cases,
but which might be a problem in all non-acute patients who are in need
of an out-patients visit. A wider and more complicated issue is, of course,
 improvement of the socioeconomic status of the whole Roma population
by increasing the educational level and decreasing unemployment (29,30).
Our finding of a poorer cardiovascular status at entry to cardiologic care
might warrant a screening for basic cardiovascular risk factors in this
high-risk Roma population, with initiation of earlier treatment when
needed. Better early detection could prevent future complications of the
disease and could improve the prognosis of these patients. Finally, access
to care and adherence to treatment of Roma patients might be improved
by addressing their skills in navigating through care and by adapting care
to their needs. Routes for the latter may be, e.g. the use of pictures and
short films to explain symptoms and reasons for treatment, see: www.
hirola.eu.
Researchers should focus their research interest on the delay in
accessing the health care system present in Roma patients and design
studies dealing with this problem. The causes of this delay might be low
health literacy, cultural beliefs among the Roma population, a lack of
material means for health care expenditures or others. Moreover, future
research on Roma and CAD should also be extended to other forms of
CAD, like acute coronary syndromes with ST elevation myocardial
infarction and non ST elevation myocardial infarction, in order to cover all
patients with CAD. We can assume that these forms might be associated
with certain inequalities in the Roma population as well, even though no
study dealing with this topic has yet to be conducted. Ethnic inequalities
in CAD with regard to Roma were shown to have an influence on the
prognosis of these patients. Yet, other factors that contribute to these
differences need to be identified and studied in larger populations.

Furthermore, a comparison of the Roma population from Slovakia
with Roma populations from other Central and Eastern European
countries could generate new knowledge about factors that predispose
them to poor health outcomes (43). Thus, an international study designed
to identify these factors might help to fill in the gaps with missing
information.

8.5 Conclusion
We conclude that Roma ethnicity in CAD is associated with worse
outcomes. Roma CAD patients entering specialized cardiologic care have
a significantly worse health status than their non-Roma counterparts. The
long-term mortality in Roma patients after CAG is about twice as high
as the mortality of non-Roma patients, and this is not due to age, gender
or education. The lack of ethnic differences in improvement of the health
status and SRH in Roma CAD patients after CAG when compared with
non-Roma suggests that the origin of these differences fully lies before
entry into the health care process. The delay in accessing health care by
Roma patients has to be investigated in future research. We hope that this
thesis will contribute to a better understanding of the differences in the
outcomes of Roma CAD patients.
References


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