

ABSTRACT

AIMS: To study how social inequality has influenced the health status of the Mexican population at the individual level from a social class perspective as well as the state level from a policy perspective between 1990 and 1996. Explore the individual and policy pathways through which social inequality affects health.

METHODS: To empirically examine the social class gradient in perceived health in Mexico a secondary cross-sectional analysis was designed using logistic multiple regression models. To empirically examine the association between social inequality and health across states, pooled cross-sectional data was used. Secondary analysis was conducted for the 32 Mexican states for 1990 and 1996 using general estimation equation (GEE) models. Path analysis was performed to explore how the electoral strength of opposition political parties shape health care resource allocation decisions which in turn influence population health.

RESULTS: The cross-sectional individual-level analysis provided empirical evidence that the lower the social class, the poorer the perception of health. The results of the pooled cross-sectional analysis indicated that social inequality across states was as expected, positively and significantly associated with maternal and infant mortality rates. The path analysis findings suggest that the electoral strength of PRD affects maternal mortality through its impact on the distribution of primary care physicians per capita via targeted health care expenditures.

CONCLUSIONS: Overall, the findings of this study provided empirical evidence that social inequality negatively influences health both at the individual and state level. The results also suggest that social inequality may be influencing health through both material and psychosocial mechanisms at the individual level and through policy mechanisms at the state level.

KEY WORDS: social inequality, socioeconomic determinants of health, social class, policy process, politics, Mexico.

INTRODUCTION

One of the most intriguing findings in the recent public health literature is the strong influence income inequality seems to have on health. The greater the income differences within populations, the worse their health differentials. This evidence suggests that worsening health conditions are associated with widening income disparities both across countries (Rodgers, 1979; Flegg, 1982; Waldmann, 1992; Wilkinson, 1992; Wennemo, 1993; Duleep, 1995; McIssac and Wilkinson, 1997; Judge et al, 1998; Armada, 2000) and within countries (Bronfman, 1992; Wilkinson, 1992 & 1996; Lynch et al, 1998; Hollstein et al, 1998; Szwarcwald CL et al, 1999; Kawachi et al, 1999, 1997; Kennedy et al, 1998, 1996; Soobader and Leclere, 1999; Shi et al, 1999).

Examining the associations between socioeconomic inequalities and health differentials is not new. Research from the Anglo-Saxon tradition (Marmot and Wilkinson, 1999; Berkman and Kawachi, 2000) as well as from the Latin American school of social epidemiology (Almeida-Filho, 1999) has made extensive and important contributions in the past. The Anglo-Saxon tradition has provided empirical evidence of how socioeconomic status measured by social class, occupation, education, and income positively influences health across the social spectrum (Marmot and Wilkinson, 1999; Berkman and Kawachi, 2000). However, this research tradition has focused almost exclusively on individual social risk factors. This dissertation proposes to go beyond this individualistic approach by focusing on the social structure of inequality as an influencing factor on health. From this perspective, the underlying assumption is that health differentials across the social spectrum are closely related to the structure of a society, which in turn is shaped by social, economic and political processes.

This approach is similar in a way to the Latin American school of social epidemiology, which has emphasized the importance of class and the context under which social inequalities and its health consequences are manifested. However, Latin American research has mostly followed a theoretical approach and has not been able to provide strong empirical evidence of their important theoretical and conceptual contributions except for a few exceptions (Bronfman, 1992; Lozano et al, 2001). This dissertation sought to reduce this empirical gap in the Latin American literature.

The more recent income inequality approach has sparked a renewed interest in this field of inquiry with its revealing empirical findings. Despite its theoretical limitations it has drawn the attention of many

public health researchers. There are three main reasons for this. First, income inequality has grown considerably both within and across most countries. Second, health differentials persist, despite overall health improvements in terms of life expectancy and other population health indicators. Third, social inequality including income can be a target for public policies seeking to improve both health and living conditions.

Most of these income inequality studies have been conducted in industrialized countries, mainly in Great Britain and the United States. Furthermore, many have failed to explicitly define a theoretical framework to guide their empirical approach. Therefore, the novelty of this dissertation lies in exploring if a similar association exists in Mexico, a middle-income country that has experienced both greater income disparities and population health inequalities over the past two decades. Studies have shown that income inequalities have worsened since the 1980s and continued through the 1990s, though at a lesser growth rate (Cortés, 1998; De la Torre, 1995; Lustig, 1998). Household survey data indicate that between 1984 and 1989 the income share of the bottom 90 percent of the total population decreased, while only the share of the top 10 percent increased (De la Torre, 1995). Using the Giniⁱ coefficient, income inequalities decreased from 0.53 in 1977 to 0.466 in 1984ⁱⁱ, increased from 0.504 in 1989 to 0.528 in 1994, decreased to 0.488 in 1996, and increased again to 0.509 in 1998 (INEGI, 1996; 1998; 2000). Overall, the degree of income inequality has increased by nearly 10 percent between 1984 and 1994. However, income is just one indicator of social inequality. The marginality indexⁱⁱⁱ, an area-based indicator of relative deprivation also shows that social inequality has not improved substantially in Mexico. According to this index, marginality has been reduced in 17 out of the 32 Mexican states between 1990 and 1995, while the remaining 15 states have experienced higher marginality figures (CONAPO, 1998). This indicator was designed by the Mexican government to assess the degree of access to basic public services and infrastructure across both states and counties.

In Mexico population health has improved in the past two decades in terms of reducing mortality rates and increasing life expectancy. However, these average nationwide improvements hide the worsening of health conditions in at least two ways. First, they do not show the regional disparities within Mexico. The reductions in infant mortality across states were not the same between 1985 and 1995. The state with the highest reduction was Tlaxcala, where infant mortality was reduced from 38.2 to 30.4 children deaths less than 1 year of age per thousand live births. This 20 percent reduction contrasts with 5 percent reduction in Baja California, the lowest, which was reduced from 26.5 to 25.1 children deaths less than 1 year of age per

thousand live births. The poorest states (Guerrero, Chiapas, and Oaxaca) reduced their infant mortality rates 14 percent on average between 1985 and 1995, but still experienced the highest mortality rates (ranging from 48.4 in Chiapas to 44.6 in Guerrero in 1995) in Mexico among its 32 states (FUNSALUD, 1998). Furthermore, a previous study (Lozano, 1997) showed that child mortality in 1994 was almost two times higher in the poorer states, 523 per thousand children under 5 years of age (Guerrero, Chiapas, and Oaxaca) than in the richest ones, 278 per thousand (Distrito Federal, Nuevo Leon, Tamaulipas, Coahuila and Baja California Sur). Health inequalities are also manifested in the adult population. The poorer states have a mortality rate of 139 deaths per thousand adults between 15-59 years of age, while the richest states have a rate of 105 per thousand (Lozano, 1997).

Second, some indicators reveal deterioration in the health of the population. For example, infant and preschool mortality caused by nutritional deficiencies increased since 1982 after years of steady decline. This specific cause of mortality accounted for 1.5 percent of total infant mortality and 2.4 percent of total preschool mortality in 1982, increasing its percentages to 5.2 and 9.1 respectively in 1988 (Lustig, 1998). A more recent study shows that malnutrition inequalities have not been reduced significantly in the past decade (Roldán JA et al, 2000). Poor states like Oaxaca and Chiapas show a malnutrition index^{iv} of 35 in 2000, while the richest states such as Nuevo Leon, Baja California and Distrito Federal present figures below 8 (Roldán JA et al, 2000). Thus, there is evidence that inequality may have an impact on health in the Mexican context. Furthermore, there is no consensus on why social inequality may affect health even if an empirical association is found. The main aim of this dissertation, therefore, was to study how social inequality has influenced the health status of the Mexican population at the individual and the state level between 1990 and 1996.

To achieve this goal this dissertation was organized as follows. To empirically examine the association between social inequality and health in the Mexican context this dissertation was divided in two parts. The first part analyzed how social inequality negatively influences health at the individual level. Using data from the Second National Health Survey (ENSA II, 1994) this level of cross-sectional analysis aims to investigate the degree and factors associated with the social class gradient in health status. Furthermore, it sought to explore the material and psychosocial pathways through which income inequality may affect health. The second part of this dissertation analyzes the association between social inequality and population health at the state level using several data sources including electoral data. This state level of analysis aimed to explore

the ecological and political pathways through which social inequality may influence health in Mexico. Finally, this study sought to draw some conclusions from its empirical findings including the policy implications of targeting social inequality to improve the health of the Mexican population.

PART I INDIVIDUAL EFFECTS OF SOCIAL INEQUALITY

The purpose of this first part of the study is to examine the association between social inequality and individual health using both individual measures and an area-based indicator of relative deprivation. This level of analysis also seeks to explore the material and psychosocial mechanisms that associate mortality and morbidity gradients with social class differentials. Individual measures were developed from ENSA II conducted in 1994. ENSA II is a personal interview type of survey, using a stratified multistage probability sample of households. ENSA II is representative of the Mexican population at both the national and the regional level. It contains information on health status and health care utilization of individuals, as well as demographic and socioeconomic characteristics of households and individuals. The survey has two questionnaires. The household questionnaire was designed to collect information for every household member, while the individual one collected information for every user of health services. The overall response rate was approximately 96.7 percent for both the household and the individual questionnaire. Data were obtained for 12,615 households, including 61,524 individuals (Secretaría de Salud, 1994).

To study the social class gradients in morbidity, the sample was restricted to the occupied population aged 12 years and older.^v This sample was divided in two groups: the urban working force and the rural working force. The first are those who worked in urban settings, while the rural were made up of people in agricultural related activities including the forestry and livestock industries. The final sample size was 13,062 individuals working in the urban sector and 4,614 working in the agricultural sector. The distinction was made because previous studies (INEGI, 1990; 1997; Bronfman, 1992; Bronfman et al, 1990; Bartra, 1991) have shown that urban and rural populations experience different socioeconomic living conditions.^{vi} For example, approximately 93 percent of the urban population in Mexico had access to drinking water services, while only 57 percent of the rural population had access to that kind of services (INEGI, 1997). A cross-sectional secondary analysis of the Second Mexican National Health Survey (ENSA II) will be conducted using logistic multivariate statistical models.

Multiple logistic regressions models were employed to examine the gradient effects of urban and rural social class on self-assessed health and reported morbidity.^{vii} Four models were specified for each morbidity indicator and for both urban and rural social classes. The full model examines the health effects of social class adjusting for age, gender, housing sanitary conditions, income, region and region marginality. The second model examined the relationship between social class and morbidity excluding income. The third model excluded marginality, while the fourth excluded both income and marginality. In sum, sixteen models were tested.

PART II POLICY EFFECTS OF SOCIAL INEQUALITY

The purpose of this second part of the study is to examine the association between social inequality and population health at the state level in Mexico from 1990 to 1997. It also explores the ecological pathways through which social inequality influences health at this level of aggregation. Studying the social, economic and political features of an area may help to better understand the relationship between social inequality and health at aggregated levels of analysis (Macintyre and Ellaway, 2000; Soobader and Leclere, 1999). However, most ecological studies have failed to explicitly define the geopolitical dimension of inequality (Soobader and LeClere, 2001; Macintyre and Ellaway, 2000; Soobader and LeClere, 1999; Malmstrom et al, 1999). Thus, this second part of the study sought to contribute in three ways to this less explored and theoretically underdeveloped research field in the social inequality and health literature.

General estimation equation (GEE) models were specified to account for the pooled cross-sectional type of data used for the analysis. Path analysis was also conducted to examine the political pathways through which social inequality affect health via distribution of health care resources. This second part of the study empirically examined the association between social inequality and population health using pooled cross-sectional data. Secondary analysis was conducted for the 32 Mexican states for 1990 and 1996 in three ways. First, partial correlation coefficients were calculated to explore the association between social inequality and three population health indicators as well as other influencing factors. Correlations between the social spending and its potential determinants, including political factors are estimated as part of this exploratory analysis. Second, pooled cross-section analysis were used to analyze the association between the three specified health indicators, social inequality, and health spending controlling for the effects of other relevant

variables. Also, the association between three health spending indicators, social inequality and potential mediating variables was examined. Third, path analysis was performed to explore the electoral pathways through which social inequality negatively influences population health.

GENERAL CONCLUSIONS

Overall, the findings of this study provided empirical evidence of how social inequality negatively influences health at both individual and aggregated levels. Although this study separated them for analytical purposes in practice they act simultaneously by shaping the physical and social areas where individuals interact as well as influencing their social and economic position within them.

The results of the individual level analysis suggest that social inequality may be influencing health through both material and stress mechanisms. The social gradient effect on health reflects a combination of negative exposures and lack of resources held by individuals in lower social positions (Lynch and Kaplan, 2000). This empirical finding suggests that social inequality may be operating through psychological mechanisms as well. In fact, poor self-assessed health has been found to be strongly associated with stress that is detrimental to health (Krause, 1987; Levkoff et al, 1987; Farmer and Ferraro, 1997). Unfortunately, no direct measure of psychological status was available in the ENSA II survey. Thus, this pathway should be further explored with more direct empirical evidence.

The results of the state level analysis seem to suggest that the extent to which states differ in terms of marginality, Solidarity health expenditures, and primary care physicians is related to a common underlying social and political process of allocating material, financial and human resources. Limitations of data availability, however, prevented more thorough exploration of the political pathways that may be mediating this association.

The findings of this study also provide some insights that contribute to the discussion of the major theoretical and methodological issues in the social inequalities of health literature. First, the choice of health indicator seemed to matter to assess the association with social inequality at the individual level confirming earlier studies that have found that self-assessed health is particularly sensitive to social class differentials (Marmot et al, 1991) and income inequality (Kawachi et al, 1999b) in industrialized societies.

Second, the choice of health care spending indicator seemed to matter as well. Primary care physician population per capita seems to have had a stronger association with lower mortality rates than the measures of health care expenditures. This finding is consistent with other studies (Wennemo, 1993; Korpi, 1989) suggesting that measures of social investment assessing how resources are allocated have a greater influence in reducing mortality rates and years of potential life lost than measures of social expenditures alone.

Third, context was important in assessing the social gradient effects of social class. Regional differentials reproduced the urban and agricultural social class division. Both levels of analysis provided empirical evidence that living in mostly urban regions such as the Metropolitan Area of Mexico City (DF) and the Center influences health differentially than living in mostly rural regions such as PASSPA and the South.

Fourth, analyzing the ecological effects of social inequality suggested that the level of aggregation is a theoretical rather than an empirical issue. Ecological studies are not necessarily limited because they do not adequately control for confounding at the individual level as some scholars suggest (Gravelle, 1998; Fiscella and Franks, 1997), but rather because they are not theoretically well founded (Macintyre and Ellaway, 2000). In sum, area-based measures seem to have had an impact on health beyond the effects of social class and income at the individual level, as well as at the state level where only aggregated indicators were included.

Finally, the ecological analysis provided evidence that relative deprivation, assessed with the marginality index, is an alternative measure to income inequality, the most used aggregated social inequality indicator. This suggests that it is not the inequality generated by income itself what is harmful for population health, but rather a socially generated inequality that manifests itself in many forms of which income and deprivation are two indicators.

POLICY IMPLICATIONS

The results of both levels of analysis also suggest policy options to overcome the adverse effects of social inequality. The marginality index was particularly insightful to explore the association between social inequality and health from a policy point of view. Its negative impact on health at both levels of analysis was consistent with many studies that have shown that health status is poorer in deprived areas (Reijneveld et al, 2000; Soobader and Leclere, 1999; Ben-Shlomo et al, 1996). Marginality is an area-based, policy-oriented

indicator that measures relative deprivation in terms of (CONAPO, 1988). The statistical significance of marginality suggests that improving the material and social conditions of the more deprived states would improve their population health as well. Thus, the empirical strength that this indicator showed, aims at policy targets to reduce inequalities in terms of basic social services and material living conditions as well as in health outcomes such as maternal and infant mortality. This indicator also suggests that poverty is playing an important role in accounting for the influence of inequality. However, the individual level analysis provided empirical evidence that the burden of disease does not affect only the poor; rather the effects of inequality are felt across the social spectrum. These findings suggest that targeting, as a policy strategy may not be as effective in reducing social inequality as more inclusive redistributive policies.

How health care resources are allocated seems to matter as well. Primary care physicians have been playing an important role in reducing the burden of mortality between 1990 and 1996. However, the high marginality states where mortality rates are higher are not the states where primary care physician ratios are higher. This finding suggests that a redistribution of general practitioners to the high marginality states may help reduce the health inequalities across states.

Social policy research has revolved around the issues of the relative importance of class, the distribution of power resources, and the possibility of political democracy in this process. In this study, the role played by PRD, the class-based, left, Mexican political party of opposition, in the design of more inclusive social policies influenced targeted health spending. Although these expenditures were not associated with lower mortality rates, the present study provided some evidence that democratic elections may play an important role as political instruments to empower the weak in the Mexican context.

FUTURE RESEARCH

The findings of this study provided empirical evidence that policy-oriented indicators should be included in the analysis to target useful interventions towards the reduction of the social inequalities associated with health. However, researchers in this field should make further efforts to understand the social causes of health inequalities. More explicit theoretical frameworks should guide the analysis of future studies. To accomplish this goal these frameworks should incorporate the concepts and underlying assumptions of other more rigorous disciplines.

Although this future research issue was somewhat addressed in this study, much remains to be done. The inconclusive results of the political factors influencing social inequality need to be empirically further explored. Recent studies (Blakely et al, 2001; Muntaner et al, 1999; Bobak et al, 1998) have shown that political surveys, which are nowadays been regularly conducted in many countries, are useful information sources for studying these pathways. Furthermore, although the evidence suggested that the electoral strength of PRD maybe shaping the design of social policy in terms of how health expenditures for the uninsured are targeted, more research is needed to elucidate how this political pathways are operating. Politics may be influencing social policy design through channels in which important political actors interact and in which statistics fails to provide answers. Thus, it would be interesting to pursue further research from a qualitative point of view to explore these political pathways.

ⁱ The Gini coefficient is a summary measure of the degree of inequality. Its values range from 0 to 1 where 0 means perfect equality and 1 perfect inequality. For developed countries the Gini coefficient of earned pretax income tends to be around 0.4.

ⁱⁱ This improvement in the distribution of income, however, should be interpreted with caution because the two sources of information are not comparable due to methodological differences.

ⁱⁱⁱ The area-based index of marginality is a policy-oriented indicator developed by the Mexican government (CONAPO, 1998) that measures the lack of basic public infrastructure as well as education and material living conditions at the state and county levels. More specifically, this inequality indicator measures the percentage of people over 15 years who are illiterate; the percentage of people without complete basic education; the percentage of the employed labor force earning less than twice the minimum wage (6 US\$ per day); the percentage of people living in households in a town with less than 2,500 inhabitants without running water, without electricity, without sewage facilities, without solid floor materials and overcrowding living conditions. Principal component statistical analysis was performed to construct this area-based indicator of relative deprivation (CONAPO, 1998). The marginality index is a normalized Z-score ranging between -3 and 3 standard deviations that correspond respectively to very low and very high marginality (CONAPO, 1998).

^{iv} The index of malnutrition was calculated through the principal component statistical technique based on information regarding stunting, infant and child mortality, marginality, indigenous population and deaths due to respiratory and gastrointestinal dis eases.

^v This age range was chosen because it is based on the official definition of the economically active population (INEGI, 1990).

^{vi} Exploratory data analysis also showed that urban and rural populations live under different socioeconomic conditions.

^{vii} All multiple logistic regressions models were analyzed using STATA Statistical Software: Release 6.0 (StataCorp, 1999).