Data Linkage--Social and Behavioral Determinants of Injuries

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The goal of this discussion is to identify social and behavioral indicators that should be linked to international injury outcome data so that the analyses of these data can be meaningful. Three main questions guided the workshop discussions:

(1)   What are the most important **social indicators** that may explain the differences in injury rates between populations (e.g., nations)?

(2)   What are the most important **behavioral variables** to be linked to international data on intentional and unintentional injuries?

(3)   What are the possible **data systems** or **data sources** from which we can derive the linkage between information about social and behavioral variables and data on injury outcome?

The discussions led to a distinction between **macro–level** and **micro–level** indicators or variables.   Macro–level variables are social indicator measures at the population level (e.g., country)—measures that might have an effect on the rate of injury in the population. In this case, the unit of analysis is a jurisdiction.

Micro–level variables are social or behavioral determinants of injury liabilities that might effect the probability of injuries in individuals. Micro–level indicators are needed to study cross–national or cross–cultural variation in patterns of risk factors and determinants of injuries. Here the unit of analyses is an individual person stratified within the jurisdiction. This distinction is quite similar to the way numerators and denominators are used to produce sample measures.

The macro analysis is usually used to study differences in population rates and to use those differences as baseline information for further analyses. Then, by using ipsative (relative) scales we are able to look at deviations on individuals from the normative means of their own country or population and then attribute those deviations to the relative risk of injury.

One cannot compare, for example, salaries and income between countries because income is based on very different baseline scales. However, one can compare the deviation or the standardized deviation of a person from the mean income of his or her country and compare those deviations across countries. Using this method, one can then analyze the relation between relative income and the probability of injuries. Such an analysis could not be carried out in the absence of both macro– and micro–level income information. The following discussion describes specific types of indicators recommended by workshop participants.

Social Indicators

I.   Macro Demographics

Three groups of macro–level social indicators were recommended. Those include (1) age distribution, (2) immigration and ethnic composition, and (3) the structure of the political, health and educational systems.

—   *Age distribution:* Injury types and rates are strongly related to age. Populations with different age distributions will produce very different patterns of injury outcomes. To enable unbiased age–adjusted cross–national comparisons, the information on the basic demographic age distribution of participating countries is essential.

—   *Immigration and ethnic composition:* Here we recommend that information about the rates of in– and out–migration should be linked together with information about ethnic minorities. What percentage, for example, of a country's population is an ethnic or religious majority and what percentage are regarded as minorities. Are there differences in the definitions of minorities across countries? A sociological measure of the orientation of the country and it's culture towards minority integration could be useful.

—   *Structure of political, health and educational systems:* It is recommended that information regarding the structure of the political system (Centralized Democracy, Confederation, etc.), the health care system, including the orientation of the national public health activities, and the structure of the educational system are important as macro–level social indicators to link to injury outcome data. In the educational system, information that might be important is the schooling structure (e.g., K–8,9–12 / K–6,7–9,10–12), the percent of out–of–school children by age group, the percent of public schools vs. private schools, the degree of centralized curriculum, mandatory education by age, and the implementation of national or regional health education curricula.

II.   Social Inequality

A great emphasis was placed by the workshop participants on the importance of measures of social inequality. It was agreed that the recommendation is to obtain the most simplified and easily obtained measures to link to injury outcome information. Two concepts on which there was a wide consensus were discussed: (1) the concept of **gradients and steepness** of social inequality and (2) the concept of **variations in indicator definitions**.

Countries differ in their social variations on socioeconomic measures. Some countries, like Norway, have a relatively homogeneous society in which the difference between the top percentile of the population and the bottom percentile is relatively small. In the United States, on the other hand, socioeconomic diversity is much greater, leading to a large gap between the very rich and the very poor populations. The steepness of these differences are important to know on a macro–level to distinguish between types of populations in terms of social inequality.

The main social inequality indicators we recommend include measures of income, education, occupation, housing, and family structure. We still have to determine what dimension of each one of these indicators are the more important and more easily obtained indicators to be linked to injury outcome data.

Concerns were raised regarding comparability of definitions and methodological issues regarding the way in which income, occupation or education are defined and measured in different countries, and how those data can be linked to local sources of information on injury outcome.

There was a wide consensus in each of the workshop regarding our need to obtain the most simplified version of the most meaningful dimension of these indicators. Simplification should increase the probability that we obtain identical and compatible information from as many countries as possible. Measures of education, for example, could include anything from the number of years of education, the number of out of school youth, or mandatory schooling.

Measures of occupation can include a simple scale of 10 or 12 accepted categories that reflect a continuum or white/blue collar. However, there are other dimensions of occupation, not only white/blue collar, that might be important. For example, what percent of the workforce is involved in agriculture or what percent of the workforce is in the service sector as opposed to industry?

It was agreed that there is a need to establish a small working group of social–science injury researchers to look into these measures in greater depth to derive the most important and obtainable measures to indicate the social inequality information that is essential for injury analyses.

In current population surveys, self–reported information is being sought, especially from adolescents and young adults. In these surveys, social inequality is being measured by several simple measures that are common to most societies. In the World Health Organization – Health Behavior in School–age Children cross–national study, social inequality is measured by three indicators that include (1) the number of cars per household, (2) the existence of a phone in the household (if yes, how many lines), and (3) does the respondent have his/her own bedroom. In the United States, a phone in the household is not a useful measure since most people have at least one phone line. Here you might need to ask questions about cellular phones, car phones or faxes.

These sound like very simple measures, whoever, when taken as a whole, we get an indicator of the social and economic quality of life that the respondent is experiencing at home. As simple as it may seem, these indicators provide an instrument to distinguish between variations in social inequality to link to injury outcome information measures in the same survey. Such measures are easily obtained on a self–reported data collection instrument.

One other area of inequality we would like to point out is the area of the **status of women** in the population. Results of many studies have demonstrated relationships between the mother's education, involvement in the workforce and alcohol behavior and the probability of childhood injuries. In the United States, for example, we find a strong correlation between reported aggressiveness by mothers during childhood and the probability of injuries during young adulthood. The findings are consistent across several population studies in that mother indicators affect childhood injuries more strongly than father indicators. We recommend obtaining information on women's education, occupational status and women's health.

III.   Family Structure and Dynamics

Studies have demonstrated that family or household structure and transitions have a profound effect on the probability of injuries among its members—especially the young ones. Interestingly enough, the findings show that the effects of family indicators on injuries are confounded by the household environment. In fact, children, who experience major disadvantages at home are at higher risk for school injuries and injuries occurring in recreational settings. There is something happening in the home environment that has to do with the family structure and dynamics that predisposes its members to higher probabilities of injuries. These dynamics and effects might differ across countries and should be measured and monitored by linkage to injury outcome information.

Indicators include the number of parents in the household—both on the macro level and on a personal or individual level, whether it is a mother–only household or a father–only household. Other family indicators include the number of children under 18 years of age living in the household, measures of crowding (i.e., rooms per capita), etc. Residential dislocation, as measured by the number of moves a family experiences, or the level of mobility in the country as a whole may also be indicators.

Another family determinant of injuries is family break–up or divorce. Findings from previous studies are quite consistent in the relationship between the breakup of the family structure and the probability of injuries. From an international perspective it is both important and challenging to operationally define and measure family break–up in various populations and societies and link that data to injury outcome information. That is, since divorce rates are very different across countries and cultures, reflecting both a difference in family break–up frequency but also a difference in the social desirability or legality of defining a family break–up as a divorce. In some countries, religious ones in particular, divorce is a non–desired status. Consequently, many families end up with separation

that are never registered as divorce. As a result, the official divorce rate might be grossly conservative compared to the actual number of families that broke apart. Therefore, it will be quite a methodological challenge to design an operational definition of family breakup that could be measured across countries and cultures using identical definitions.

IV.   *Other Social Indicators*

Other relevant and important socioeconomic indicators to be linked to injury outcome data may include: **degree of industrialization, religiosity, urbanization and access to health care.**

Herb Garrison covered some of the issue of access to health care in another workshop presentation. However, since we were talking about information at the macro– and micro–level we ought to point this out again.

At the macro level, we think it is important to obtain information on how people obtain access to health care. Is it direct fee–for–service or a form of health system reimbursements for care through mechanisms such as universal coverage. Does funding for care come from sources such as governmental taxes or combinations of private and public health insurance. Within a reimbursement system, data should include the extent to which the population has health care coverage and the socioeconomic characteristics of the people in that population according to their coverage type.

When talking about the organization of the medical care service resources, we need to know about protocols for access to hospitalization, outpatient care, or emergency systems. What is the organization of those systems? Does organization differ by place of residence, i.e., urban vs. rural sources. At the macro level, information should include the distribution of the population and the case mix at each medical care source. In other words: who isn't getting care? Are we measuring only people who are getting into the system, and what percentage of the population isn't getting care.

This leads to the need to identify access to care at the micro level. Knowing the individual's position in that system in relation to medical care access yields a numerator for the macro level denominator.

Other macro–level indicators that were mentioned include: Exposure to wars or other types of social violence or exposure to natural disasters.

Behavioral Indicators

Most of the workshop time was dedicated to social indicators. Nevertheless, we did identify several areas of risk behaviors that should be collected with injury outcome data due to the central role these behaviors play in the injury matrix.

Injury Risk Behaviors

The main risk behaviors to be included are:

(1)   Use of alcohol and other drugs—especially in conjunction with dangerous activities such as driving or riding cars, high risk sports, etc.

(2)   Use of protective gear such as helmets, seatbelts, safety sport equipment, when engaged in activities that require them.

(3)   Involvement in physical fights and other interpersonal violence, especially physical fights with injuries, which is a more severe behavior.

(4)   Access to and use of weapons—not only handguns which are most important here in the USA, but also weapons like knives and clubs.

(5)   Measures of suicidal ideation and behavior. Four hierarchical measures are used as part of the Youth Risk Behavior Surveillance System here in the United States that are examples of simple measures that can be used to compare suicidal information across countries.

Indicators Related to Risk Behaviors

There are some other personal behaviors that are linked indirectly to injuries. For example, patterns of health risk behaviors such as smoking and sexual habits might be indicative of injury prone lifestyles. Recent findings indicate that early onset of health related risk behaviors are associated with risk for injuries in later adolescent years.

Some participants suggested obtaining information regarding exposure to activities that indirectly relate to injuries. For example, number of hours spent at school, number of working days per week, etc.

On another level, social norms and regulations are related to behaviors. Examples include legislation regarding legal drinking or driving age and the use of mass—media campaigns to reduce specific types of injuries.

Possible Data Systems

This topic was covered quite nicely by previous workshops. However, some additional suggestions that were raised in our discussions. It was suggested that there might be a source of international data, such as the one obtained and maintained at Andre L'Hour's department at the World Health Organization's headquarters in Geneva, that includes most of the macro—level social indicators for many countries around the world.

In addition to the usual existing sources of national data—such as census data, police records, etc.—there was a strong consensus that there is a need for designing and implementing more cross national population surveys. There are several cross—national projects at WHO that are based on population studies in many countries. One of them is MONICA—a study of cardiovascular risk factors in 47(!) countries around the world.

We strongly feel that it is time to develop a population—based survey system focussed on the prevention of injuries and injury—related risk factors. We can not think of a better time than now to begin working on such surveys, especially if we are able to include some longitudinal and cross—national designs. Such a system will enable us to look not only at determinants and predictors of injuries but also at the whole process of the injury matrix, providing us with instruments to evaluate the efficacy of injury prevention strategies across nations.