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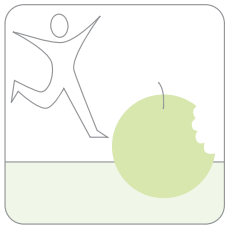
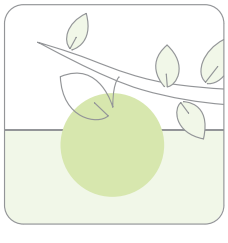
The magnitude and spectrum of farm injuries in the European Union countries








THE MAGNITUDE AND SPECTRUM OF FARM INJURIES IN THE EUROPEAN UNION COUNTRIES

FINAL REPORT

Prepared for the European Commission, DG SANCO

Department of Epidemiology, Athens University Medical School,

Center for Research and Prevention of Injuries (CE.RE.PR.I), Athens, Greece

Athens, July 2004

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THE MAGNITUDE AND SPECTRUM OF FARM INJURIES IN THE EUROPEAN UNION COUNTRIES

FINAL REPORT
July, 2004

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Date:	July 2004

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SUMMARY

During the last decade, the European Union (EU) Community has mainly focused its financial and scientific health resources devoted to health in agricultural sector on the prevention of mass spreading of diseases thought to be originating from these settings (e.g. Creutzfeld-Jacobs, diseases related to exposure to dioxins, etc.). It is easily understood why such striking health problems with a major potential to become an epidemic constitute major concerns for the Community, however, it seems that another important public health issue, that is responsible for a higher burden both in terms of mortality and morbidity- namely farm injuries- has been somehow neglected. A plausible explanation for not properly investing in research and prevention of farm injuries might be that the EU agriculture has been declining during the last decades. However, this sector still contributes fundamentally to the economy and prosperity of the EU countries. Moreover, the inclusion of New Member States, which base an essential part of their economy on agriculture, has led to an increased representation of agriculture in the EU economy.

As pointed out by epidemiological studies, farming is one of the most dangerous occupational activities with a well-recognized high severity in terms of morbidity and mortality. Figures concerning the burden of these injuries in the United States show a high mortality rate of 22 deaths per 100,000 farm workers, while in the EU countries (EU15) the corresponding rate is 13 per 100,000 farm workers. A more striking impression makes the fact that *these numbers are comparable to those concerning motor vehicle accidents in the general population*, which are considered to be the

injuries responsible for the highest public health burden (16 deaths per 100,000 US citizens and 11 deaths per 100,000 EU citizens, respectively). Concerning the morbidity associated to farm activities, it has been reported that each year one in three farmers will sustain an injury. Use of modern machinery in farming increase the severity of these injuries, whereas children are exposed to increased hazards (heavy machinery, pesticides, etc.). Farm injuries non-related to work are also a cause of concern, but data concerning farm injuries occurring during leisure time are scarce.

The public health significance of farm injuries, however, has not been widely recognized and problems associated with farm activities have not received adequate attention from the scientific EU community. Systematic efforts that will prepare the background for undertaking reliable preventive strategies to confront this significant problem are essential. The accurate assessment and proper illustration of the consequences of farm injuries are necessary prerequisites for the successful application of any future intervention programs.

In response to the above issues, the EU Commission for Injury Prevention (DG SANCO) has financed the project "Magnitude and spectrum of farm injuries in the European Union Countries", run by the Greek Center for Research and Prevention of Injuries, Athens University Medical School. This was the first proposal aiming to assess the potential of former EHLASS system (currently called Injury Data Base-IDB) to capture a sizeable fraction of farm injuries, providing a unique opportunity to explore the magnitude of this public health problem in EU, identify risk factors and vulnerable population groups, and propose prevention measures. The report presented hereby offers a detailed insight into the course of the project, emphasizing the work

that has been simultaneously undertaken in seven EU collaborating countries and providing the results and further recommendations for action at EU level.

Overall, the project "Magnitude and spectrum of farm injuries in the European Union Countries" succeeded both in terms of achieving its goals by exploring the magnitude of farm injury problem, identifying major risk factors and population at risk, proposing strategies for prevention, and employing the EU network of experts in injury prevention and control. It is worth noting here that, besides the exploration of data provided by the former EHLASS, extra analyses were performed where data on occupational injuries were available, so that a measure of comparison between leisure farm injuries and those accidents that happened at work was provided.

As shown by the findings of this project, farm injuries, whether occupational or leisure, are a very important issue in the European Union countries and should be tackled efficiently. Injury Data Base (IDB) has been proved to be effective in capturing farm leisure injuries in all participating EU countries. Certain populations at high-risk for sustaining such accidents have been defined, such as for example, children, young migrant workers or pensioners. Farm injuries are severe in terms of morbidity and mortality and it is imperative that the European Commission dedicates substantial efforts for their prevention. Pertinent strategies targeting the high-risk populations living and working in this unique setting should be performed, as many of these injuries are amenable to prevention efforts. Guidance materials for farmers, modern farming machinery should be considered for the prevention of occupational farm injuries, while building a safe home and surrounding farm environment, could contribute to the reduction of leisure farm injuries.

This Project brought useful information concerning the profile and consequences of farm injuries in EU Member States. The outcomes of this collaborative EU effort, however, should initiate further scientific intervention researches in order to efficiently deal with this significant topic of Public Health. An early-warning system for monitoring farm injuries could be created through the network of National Farm Data Systems. Also, European wide educative programs focusing on safety in farms should be taken into consideration. These could be two ambitious and intriguing follow-up work steps that have the potential to further lead to an efficient tackling of this important EU issue and produce a substantial reduction of farm injuries.

INTRODUCTION

Despite the magnitude and the severity of farm injuries and the realization that farmers are one of the most vulnerable sectors of population, this important health topic has received scant attention from the European scientific community and there is a paucity of data regarding the underlying risk factors. Farming may have been declining during the last decade, but a sizeable fraction (about 10%) of the EU 15 population is still involved in this occupational sector, especially in southern European countries {Organization for Economic Cooperation and Development (OECD), 2001}. Moreover, considering the adhering process of New Member States to the EU, this occupational domain that is highly represented in most of these countries is likely to increase its contribution to the EU economy.

The project proposed by the Center for Research and Prevention of Injuries (CEREPRI), Department of Epidemiology, Athens University Medical School, entitled "The Magnitude and Spectrum of Farm Injuries in European Union Countries" was run under the auspices of DG SANCO, Injury Prevention Program (IPP) and addressed the issues mentioned above.

The primary goal of the project was **to develop indicators** for facilitating the development of public health policies for prevention of farm injuries in the European Union countries through:

- Examination of policy areas relevant to safety issues in relation to farm injuries at EU level

- Exploitation of the former EHLASS data (IDB) on farm injuries in order to assess adequacy, comparability, reliability, and validity of existing coding systems with regards to farm injuries
- Search for additional data sources in close collaboration with EUROSTAT with a view to the feasibility of including information on farm injuries (to the IDB).

The ultimate goals of the program in this direction are:

- Assessment of the burden of farm injuries in EU Member States and identification of major risk factors and population groups at risk.
- Formulation of a memorandum of commonly accepted practices for the prevention of farm injuries.

OVERALL MANAGEMENT OF THE PROJECT

The tasks listed previously have been successfully fulfilled with the important contribution of experts in injury prevention from seven participating EU countries (namely Austria, Denmark, Greece, France, Netherlands, Portugal, and Sweden) and Israel, under the guidance of the Greek leading team and the EU Commission. Moreover, the EUROSTAT has also contributed to this project through the expertise of its representative, Mr. Didier Dupré, a specialist in this domain. Concerning the general organization of the project, the Greek leading team ensured the overall managerial component of the project, facilitating good interaction and cooperation between all partners involved, making sure tasks were accomplished appropriately, on time, and within the budget, taking care of administrative details and providing proper flow and dissemination of information. Also, scientific expertise was provided throughout the project's lifetime. With two exceptions (Hungary and the UK) all EU partners that initially declared their interest in this program could actively participate in all the project's tasks, including the provision of injury data and interpretation of analyses. Mrs. Gofin, the representative of Israel (EFTA country) has provided her high scientific expertise and played an important advisory role.

For the implementation of this project, a work strategy has been adopted by the research team, taking into consideration the analytical timetable mentioned in the contract with the Commission. The analytical work plan was distributed at the beginning of the program to all project's partners along with two other documents, concerning an overview of the project and collaborating organizations, respectively. (**Annexes 1, 2, 3**)

DESCRIPTION OF THE ACCOMPLISHMENTS OF PROJECT'S TASKS

Overall, this project has run successfully according to the stated aims and the timetable and has enabled the participants to collaborate in a topic of substantial public health importance and exchange experience. A presentation of each topic that has been tackled during this project is provided synoptically below. More information on each task is further presented in detail in the continuation of the present report.

1. *A Critical review* of published references concerning frequency, gender occurrence, potential risk factors and health consequences of farm injuries has been undertaken by the Coordinator Center with the important contribution of EU collaborators. Brain storming sessions during the Project's principal meeting (**Annexes 4.1** and **4.2**: agenda and minutes of the meeting) and gray literature provided by collaborators were used to retrieve important information to complement this review. The results of this task are analytically presented in the continuation of the present report (Chapter 2, page 17). A variety of methods was used, such as methodological searches of medical databases and a variety of specialized libraries, scanning the reference list of relevant literature reviews and other important books and articles on farm injury topics, and hand searching of journals. More than 60 studies covering farm injury issues have been reviewed, referred and commented and important findings were summarized in tables. In Chapter 2, a narrative review is provided, along with the respective analytical tables, describing the above mentioned issues related to farm injuries, as stated in the Project's aims;

2. *Identification of existent data sources on farm injuries, classification and systematic review of their strengths and weaknesses* was performed in participating countries and the results are provided in Chapter 3 (page 58). For obtaining information on the existing farm injury data sources and creating a relevant inventory of these, a special questionnaire to guide the process was developed by the coordinating center and further distributed to the collaborators of this project for completion (**Annex 5**). Partners from Austria, Denmark, France, Greece, Israel, The Netherlands and Sweden, have explored the characteristics of such data sources (where they were available), made the necessary efforts for obtaining the appropriate documentation, filled in this form and provided the requested information. Additional information was obtained from the EUROSTAT, provided by an expert in occupational injuries (and implicitly, farm injuries), Mr. Didier Dupré. Data were summarized in tables and strengths and weaknesses of these data sources have been assessed.

3. After having prepared this important background work, the next step was the actual *exploitation of farm injury data provided by the former EHLASS database (IDB) (presented in Chapter 4, page 74).* For retrieving harmonized data from all EU participating countries, an operational definition was developed and agreed upon. Farm injury data from all participating EU countries were provided (data on farm injuries occurring during leisure time, as provided by former EHLASS database-currently called IDB-, complemented with data on occupational farm injuries, provided by certain databases and the EUROSTAT), centralized by the Greek team, and further analyzed. A description of the methodological process, results and comments are provided in Chapter 4. Supplementary work was done by all

participants to complement these data with information concerning the pattern of agricultural activities in each of EU collaborating countries, so that a link between the mechanism of farm injuries and type of farming activities characteristic for each setting was done. In this chapter, issues such as the quality of the information of data of farm injuries provided by the former EHLASS database as compared to those provided by the additional data sources are appraised. Emphasis on major risk factors for farm injuries and vulnerable population groups by type of accidents, as resulted from the analysis of EHLASS data, is particularly given. Discussion of the main findings of this study and their consequences at EU level, along with the strengths and weaknesses of different coding systems covering farm injuries, is provided separately in Chapter 6.

4. *Development of public health indicators* for the assessment of the public health burden of farm injuries in the European Union Member States. Based on the results of the above tasks and suggestions made by the Project team, public health indicators designed to measure the problem of injuries in farm settings were proposed and are presented in Chapter 5. For each indicator that was chosen, a short review of its feasibility is also provided, so that a measure of their concrete usefulness is provided.

5. Development of *specific public health initiatives* aiming to improve prevention of injuries due to farming activities in the EU countries. A memorandum of safety practices focusing on the prevention of farm injuries has been elaborated by the Project team, in terms of recommendations for further actions at EU level (Chapter 6). It is envisioned that this will be an important tool for lobbying for the protection of

this vulnerable population group in the EU, so that investments in farm injury prevention could be facilitated.

6. One *meeting* between the collaborators of the study was held in Athens. (**Annexes 4.1, 4.2**: agenda and minutes of the meeting)

7. *Dissemination of the result*s via information exchange in the context of media, scientific forums and web site pages. The results were and continue to be *disseminated.* Summarizing, the scientific results have been widely presented in different ways, such as a publication in the well-known Journal of Agricultural Safety and Health (JASH), detailed presentation of the results during the 7th World Conference for Injury Prevention and Control in Vienna, Austria, and several national medical and injury prevention conferences. Also, all relevant presentations related to this project were posted on the web site of EURO IPN (European Injury Prevention Network- www.euroipn.org) and CEREPRI- Athens University Medical School (http://www.cc.uoa.gr/health/socmed/hygien/cerepri/activ.htm), contacting different experts on injury prevention and farm injuries, etc. The dissemination process will be continued after the end of the project through contacts with the institutions involved in the prevention of farm injuries.

8. Elaboration of final report.

DELIVERABLES OF THIS PROJECT

- Literature review concerning frequency, gender occurrence, underlying causes and consequences of farm injuries
- Inventory, classification, review of data sources concerning farm injuries in participating countries
- Recommendations for the prevention of farm injuries in the EU countries
- Publications concerning the burden of farm injuries, major risk factors and population groups at risk in a peer reviewed journal and national newspapers (**Annex 6**)
- Participations in different national and international conferences (**Annexes 7, 8**)
- List of indicators for facilitating the development of public health policies for prevention of farm injuries in the European Union countries
- Dissemination via Website of CEREPRI and EURO IPN (http://www.cc.uoa.gr/health/socmed/hygien/cerepri/activ.htm, http://euroipn.org)

MAGNITUDE AND PATTERNS OF FARM INJURIES IN EUROPEAN UNION COUNTRIES

LITERATURE REVIEW

INTRODUCTION

Farms are special settings in regard to work and lifestyle that imply close contact to nature, but also a high exposure to hazards, such as physical, chemical and biological agents. The term "farm injury" characterizes accidents that happen in farm settings (outside the home) to farm workers, non-working farm residents, and visitors (Centers for Disease Control, 1992). These injuries, occupational or leisure- related, are among the most severe ones, being responsible for a large number of fatalities and lifetime disabilities.

Indeed, agricultural work is among the most hazardous occupations as it ranks among the *top jobs* in the work injury statistics in the United States. The fatality rate of these injuries is six times higher than the rate of all industries combined (Mason and Earle-Richardson, 2002). In addition, leisure-related farm injuries have become a cause for concern (Franklin et al, 2001). Figures concerning the burden of these injuries in the United States show a mortality rate of 22 deaths per 100,000 farm workers (Rautiainen and Reynolds, 2002), while in the EU countries (EU15) the corresponding rate is 13 per 100,000 workers (EUROSTAT, 1999). A more striking impression makes the fact that these numbers are comparable to those concerning *motor vehicle accidents*, which are considered to be the injuries responsible for the highest public health burden (16 deaths per 100,000 US citizens and 11 deaths per 100,000 EU citizens, respectively, WHO Statistics).

Agents such as farm vehicles, tractors, and farm structures have been reported as the most common causes of fatal *farm occupational injur*ies, while drowning and vehicle accidents were among the most common mechanisms of fatal injuries for *non-work related farm deaths* (Franklin et al, 2001). Differences in risk behavior have also been reported in rural communities (Zwerling et al, 2001) with farmers being more likely to use more often all-terrain vehicles than townspeople or rural non-farmers, and to have fired a gun in the last year.

Children often live, play or even work in farms and they are exposed to the dangers of tractors, machinery, and livestock (Mason and Earle-Richardson, 2002). There are difficulties in determining child agricultural injury rate due to lack of information about actual hours of exposure, since farm children may be exposed to accidents when working, playing, as well as when visiting the farm (MMWR, 1998).

Despite the magnitude and the severity of farm injuries worldwide, the topic has received scant attention from the European scientific community and there is a paucity of data regarding the farm injury incidence and the underlying risk factors. Farming may be declining in Europe, but a sizeable fraction of about 10% of the labor population is involved with it (Table 1), particularly in southern European countries (OECD, 2001). Moreover, with the addition of New Member States, the agricultural population of EU has increased (Table 2). Most studies covering farm injuries (occupational or leisure-related) focused on farm populations from the United States, Australia and Canada. In *Europe*, farm injury topic has been appropriately studied only in few countries and researches have been usually limited to occupational accidents, as registers on work accidents are the main source of farm injury data at

European level, while in-depth analyses were rarely undertaken. Difficulties in quantifying the magnitude of farm injuries have been attributed mainly to the limitations that the usual farm injury data sources have (May, 1990; Merchant, 1991).

Table 1. Representation of agricultural labor force (percentage of the total labor force) in European Union Member States (EU15), 2000 (data source OECD, 2001)

Country	%
Austria	5.8
Belgium	2.2
Denmark	3.3
Finland	6.1
France	4.0
Germany	2.8
Greece	17.0
Ireland	7.9
Italy	5.4
Luxemburg	1.9
Netherlands	3.0
Portugal	12.6
Spain	6.8
Sweden	2.4

Table 2. Agricultural labor force in the 10 New and Candidate EU Member States (percentage of the total labor force), data source: http://www.nationmaster.com/country

Country	%
Poland	27.5
Hungary	8.0
Czech Republic	5.0
Slovenia	11.0
Estonia	11.0
Romania	40.0
Bulgaria	26.0
Slovakia	8.9
Lithuania	20.0
Latvia	15.0

OBJECTIVES

According to the principal aim of this Project, developing indicators for facilitating the development of public health policies for the prevention of farm injuries in the EU countries, the first step for providing the necessary background for achieving this goal was to explore the existent knowledge about farm injury areas, which was made by:

1. Critically reviewing published references concerning the magnitude, pattern, and risk factors of farm injuries, with a special emphasis on farm injuries in European Union countries, and 2. Identifying, classifying and reviewing the existent data sources on farm injuries in participating EU countries. Our *main hypothesis* was that there are differences in the frequency, types and severity of farm injuries among nationals of collaborating countries and among different age groups.

METHODOLOGY

For the purposes of this study, published references concerning farm injuries have been identified by:

- Methodological searches of medical, injury, and agricultural databases and a variety of specialized libraries
- Scanning the reference list of other literature reviews, books and other relevant articles in farm injury field
- Hand searching the journals specialized in injury topics

- Collaborating with EU collaborators in participating countries for gathering important articles (gray literature) on farm injury topic that are available for each country.

Most relevant findings, focusing on important issues such as incidence of farm injuries, risk factors, and population groups that are at high risk for sustaining farm injuries due to an increased exposure to farm environment, have been summarized in tables and an narrative review is provided.

Data sources

- Pub Med (www.ncbi.nlm.nih.gov/PubMed/)
- World Health Organization (www.who.int)
- WHO Statistical Service (WHOSIS: http://www3.who.int/whosis/menu.cfm)
- Centers for Disease Control and Prevention (www.cdc.org)
- Elsevier Science (www.elsevier.nl)
- Agricola (http://www.nal.usda.gov/ag98/)
- National Agency Safety Database (http://www.cdc.gov/nasd/menu/state/niosh_abstracts/child_safety.html)
- Labour Force Statistics 1980- 2000. OECD, 2001 (http://sv5.vwl.tuwien.ac.at/literatur/OECD/oeclfs.pdf)
- Safety Lit (http://www.safetylit.org)
- Online medical journals:
  - ✓ The Lancet: www.thelancet.com
  - ✓ British Medical Journal: www.bmj.com

- ✓ The Journal of American Medical Association: http://jama.ama-assn.org/
- ✓ The New England Journal of Medicine: http://content.nejm.org/
- ✓ Injury Prevention (http://ip.bmjjournals.com/)
- ✓ Journal of Agricultural Safety and Health (http://www.asae.org/pubs/jash.htlm)
- ✓ Injury Prevention Literature Update: (http://www.safetylit.org/)

Key words

- farm injury, agricultural injury, injury in rural population
- farm injuries AND home and leisure activities
- farm injuries AND incidence AND prevalence AND risk factors
- farm injuries AND public health burden
- occupational farm injuries
- children AND farm injuries
- farm injuries AND population at risk

DEFINING FARM INJURIES

Farms are not only a place of work but also a place of residence and recreation. Thus, for having a proper definition of farm injuries, there is need to consider various contexts of occurrence of these accidents:

- **Injury setting**: The place where farm accident occurs. In that case, any person that is injured in that setting would be accounted for, regardless of the activity (whether occupational or not), his/her place of living (whether a resident or a visitor), and the place of occurrence of the event (field, etc.). An example of this is the CDC definition (1992) which defines farm injuries as "accidents that happen on the farm (outside the home) to farm workers, non-working farm residents and visitors"
- **Occupation**: It refers to an injury that happened while working in the farm. This definition can also include, as in other occupational injuries, those occurring while going or coming from the farm. Injuries that occur in the home premises are not included. An example of this is used in the Agricultural Injury Surveillance program in Canada (Hartling et al, 1998). The definition includes unintentional acute injuries (resulting in death or hospitalization) that occurred during activities related to the operation of a farm or that involved any hazard of a farm environment.

The selection of the definition depends on the purpose of the study. If it is to identify the farm as a risk environment regardless of the occupation or activity performed, or place of residence, then the setting is the most important factor. If it is to

determine the incidence of occupational injuries, then the activity and occupation of the injured person should be determined; thus, only those defined as farmers and who were working in the farm should be counted as events. Alternatively, only the activity (working in the farm or farm-related activities) should be the criteria for inclusion, regardless of the occupation of the injured. Through the refinement of the definition it could be possible to identify exposures and specific hazards that are important to guide preventive efforts.

It needs also to be considered whether to include *events occurring at off-farm locations*, but related to farm activities, such as those related to the transportation of agricultural equipment or produce in a public road, or an accident occurring to a farm vehicle (i.e. tractor) in a public road. The *intentionality* of the injury is not mentioned as it is assumed that only unintentional injuries are included.

Another issue to be taken into account is the denominator, when calculating rates of farm injuries. The options are to use the *general population* or the *specific population* at risk. For the former the rates will not express the specific risk, but the frequency of the event in the population. For the latter, expressing the risk of occupational farm injuries, the proper and updated registration of farm workers is required, including migrant and seasonal workers (whose inclusion will need consideration of time of exposure), and specific occupations. The feasibility of getting this information and its accuracy are important factors to be considered. In cases when only numerator data is available, the distribution of those involved (whether farm workers or others), the place of occurrence or the activity performed will provide the frequencies of the

events within the overall farm injuries but not the specific risks.

For the purpose of our research, we used the definition provided by the CDC, that defines "farm injury" as any accident that occurs on the farm (outside the home) to farm workers, non-working farm residents, and visitors (Centers for Disease Control, 1992). This definition has the advantage to cover all farm accidents that take place in agricultural environment, namely work related and leisure injuries respectively.

FARM INJURIES: ESTIMATING THE PROBLEM

Agricultural occupational injuries are among the most severe and costly work related injuries. In the *United States*, farming contributes roughly 30% more than the national average to occupational injury cost and accounted for more than $4.5 billion in 1992 (Leigh et al, 2001). Work related farm injuries have been studied with a variety of methods and source populations, most of them located in the United State, Canada, Australia, or some European countries (Virtanen et al, 2003). Thus, the estimates of the magnitude of farm occupational injuries vary according to the source of data and farm settings in which the respective analyses have been performed. In Table 3, the incidence/ prevalence of farm occupational injuries in different community settings and at national level is presented.

More specific, in the *United States*, the fatality rate in agriculture was about 22 per 100,000 workers through 1990s, with tractors being the leading source of death and causing approximately 300 fatalities each year (Rautianen and Reynolds, 2002), mostly due to overturns (Hard et al, 2002). The reported injury rate was 0.5 to 16.6 workers across the United States (Rautianen and Reynolds, 2002). The highest risk for

occupational farm activities was recorded among *older farmers*, (Hard et al, 2002; Richardson et al, 1997; Crandall et al, 1997). *Youth agricultural* labor force and children, however, also account for farm occupational fatalities (Myers and Adekoya, 2001; Heyer et al., 1992). As shown by data from Vital Statistics Mortality and Occupational Mortality surveillance systems, a decreasing trend in regard to occupational farm deaths among young people aged 16 to 19 years old has been recorded (12.0 deaths per 100,000 workers for 1982-1985 down to 4.9 deaths per 100,000 for 1991-1994, respectively) (Myers and Adekoya, 2001).

As reflecting the pattern and frequency of agricultural activities across the United States of America, there are differences in regard to injury and mortality rates in farm occupational works, and injury characteristics, respectively. A state-based study concerning severe farm injuries among *New York* farmers revealed a 9% incidence of injuries and an increased risk among owner/ operators of the farm and in farms with high gross sales (Hwang et al, 2001). In *Iowa*, about 10% of farm operators reported being injured during farm work; the most significant risk factors associated with farm occupational injuries were younger age, having an impairment or health problem that limits work, and hand or arm exposure to acids or alkalis (Park et al, 2001; Lewis et al., 1998). In a study conducted among farmers from *Alabama* and *Missis*sippi, 23.4% of participants reported a prior injury (Lyman et al, 1999). Prior injury was more frequent among white owner/ operators (29.1%) compared with black workers (18.9%), and black owner/ operators (15.2%) (Lyman et al, 1999). Among *Kentucky* farmers, a population based study reported a cumulative injury rate of 9%; the leading external causes of farm injury were falls, machinery, woodcutting and animal-related events (Browning et al, 1998). Farmers working in farms with beef cattle and tobacco

had a statistically significant increased risk for a farm- related injury (Browning et al, 1998). In *North Carolina*, the crude farm injury mortality rate was 38 per 100,000 worker- years through 1997- 1991 (Richardson et al, 1997). More than 50% of these injuries were due to tractors and the highest risk was recorded among older farmers and African-Americans (Richardson et al, 1997). Deaths among children and adolescents during occupational activities were also considered in North Carolina and farms were found to be the most hazardous injury settings, accounting for almost 30% of all occupational deaths at this age (Dunn et al, 1993). In a study based on medical examiner data for all occupational injury deaths in *New Mexico* from 1980 to 1991, Crandall et al found a mortality rate of 21.3 per 100,000 farm worker- years with farm workers being 4 times more likely than non-farm workers to die from occupational injury (Crandall et al, 1997). Half of the farm decedents were 50 years of age and older and crush injuries accounted for one out of two farm injury deaths, half of these involving a tractor rollover (Crandall et al, 1997). In *Minnesota*, a survey run among 2,250 adolescents from 6 high schools reported an annual injury rate for young farm workers of 25.9 per 100 full time equivalents (Munshi et al, 2002).

In *Canada,* farm injuries also account for a significant burden of injuries and deaths. The hospital costs due to agricultural injuries (1985-1993) ranged from $768 to $62643 (Canadian dollars) (Hartling et al, 1997). An epidemiological analysis of national farm-work mortality data between 1991-1995 provided by the Canadian Agricultural Surveillance Program revealed an overall annual rate of 11.6 deaths per 100,000 farm population (Pickett et al, 1999). High rates were observed among men of all ages and among elderly people, and the leading mechanisms of dead included tractor rollovers (Pickett et al, 1999). Among older farmers, the overall mortality rate

was 32.8 per 100,000 population per year, with farm owner-operators accounting for almost 83% of deaths (Voaklander et al, 1999). Non-fatal occupational farm injuries have been estimated in a population-based study from Ontario to 5.8 per 100 persons per year (Pickett et al, 1995). Common mechanisms of injury included injuries related to the use of farm machinery, overexertion from lifting, accident falls, and injuries that occurred while working with animals (Pickett et al, 1995). A previous investigation conducted in 117 eastern Ontario beef and dairy farms during one-year period found an overall farm injury rate of 7 per 100 person-years (Brison et al, 1992).

In *Australia*, agriculture is subject to rates of work-related deaths that are among the highest in this country (Fragar, 1996). In a study concerning farm related deaths in Australia during the period 1989- 1992, the fatality rate per 100,000 workers was four times higher for agricultural industry workers (20.6) compared to all-industry rate during the same time frame (5.5) (Franklin et al, 2001). Agents such as farm vehicles, tractors, and farm structures were among the most common mechanisms of injury, while the transport for work purposes, working with animals, working with crops, and maintenance were the most activities being undertaken at the time of fatal injury (Franklin et al, 2001). Concerning non-fatal farm work injuries, the results of a survey showed that 1 out of 5 farmers in Australia reported being injured every year, while 1 in 12 reported at least one serious injury (Low et al, 1996). Animal-related injuries were the largest category for agent of injury, while the farm workshop or shed was the most common injury place (Low et al, 1996). In Tasmania, 38% of the sample of farm workers that have been monitored during a 2-year period had sustained at least one injury on their farm (Mather and Lower, 2001). More than 30% of these injuries have been recorded in sheep industries (Mather and Lower, 2001).

In *New Zealand***,** the reported prevalence of farm injury during a one-year period in a cross sectional study of a random sample of farmers in Southland was 17.1%.

In *Europe*, in-depth analyses of data concerning farm injuries are scant and inconsistent and farm injury has been appropriately studied only in few countries. Data from EUROSTAT concerning accidents at work in the European Union countries shows that in 1999, more than 370,000 accidents with more than 3 days' absence from work were recorded in agriculture, hunting and forestry, corresponding to an incidence rate of 7,510 per 100,000 workers. Fatal work accidents accounted for a number of 631 deaths of employees in these domains, with a mortality rate of 12.4 per 100,000 workers in 1998. (Dupré, 2001). Compared to other occupational accidents, the injury and fatality rate in *agriculture,* hunting and forestry is *particularly high*. The 1999 labor force survey showed that agriculture, along with construction, transport, and fishing occupations, are the activities involving major accidents at work (Dupré, 2001). It seems that in Europe, young male farmers aged 15-24 years old with primary and lower secondary education experience high injury rates.

More specifically, in *France*, the Mutual Society of Agriculture reported a number of 47,557 agricultural work accidents during a three-year period (1996-1998), 5,636 serious injuries and 219 fatalities (Injury risk in agriculture workers, report provided by Marc Nectoux).

In *Denmark,* farming ranks as the industry with the highest incidence of fatal injuries. National statistics and scientific investigations revealed that agriculture is among the most dangerous trades in Denmark with a fatality rate of 10-14 per 100,000 person-years, *four times higher than the mortality rate in the working population in general* (Carstenson et al, 1995). In a study examining the occurrence of farm injuries in a representative sample of 393 farms (Rasmussen et al, 2000), the reported overall injury rate was 23.6 per 100,000 working hours, with the highest injury rate recorded in swine farms (33.1). Overall, farm injuries occurred among 32% of full-time farmers and farm laborers each year. Adults less than 50 years of age had almost double risk compared with those over 52 years of age. Animal related work was the most common injury mechanism, while the most dangerous task relative to the number of task specific hours was repair and maintenance work.

Work farm injuries during a two-year period (1996- 1997) were assessed in a national *Finnish* cohort study run by Virtanen et al. (2003). The incidence of farm occupational injuries was 5.8 per 100 person- years for women and 9.1 for men, with the highest injury rate recorded among hog and cattle farm workers (9.7 and 8.7 per 100 person- year respectively).

With about 15 percent of the labor force involved in agriculture, *Greece* has the highest proportion of farming population among the European Union member states {Organization for Economic Cooperation and Development (OECD), 2001}. In Greece, a country with mild climate, the nature of agriculture is similar with that of other Southern European countries. To our knowledge, national representative data concerning incidence and prevalence of farm injuries are not available. A number of

4,326 unintentional farm injuries have been recorded by the Greek Emergency Department Injury Surveillance System during a five- year period (1996-2000) (Alexe et al, 2003). They were frequently serious and required hospitalization. Farm injuries show distinct patterns among *older women* (lower limb fractures), *young individuals* (non traffic vehicle related injuries) and *migrant workers* (injuries from cutting and piercing instruments, falls from high level and bites) (Alexe et al, 2003).

In *Spain*, there were almost than 610,000 occupational injuries causing absence from work for more than 3 days during 1997 (Sese et al, 2002). Out of them, 1058 were fatal, 10.1% of them occurring in agriculture.

In *Sweden*, 667 occupational injuries were recorded in agriculture and hunting during 1999, corresponding to an incidence rate of 2.8 per 1,000 workers (Nordin & Bengtsson, 2001). Out of these, 13 were fatal, a fact that defined the agriculture as the branch of activity with most fatal occupational accidents.

Table 3. Research overview of farm occupational injuries

Country	Author, year	Methodology	Participants	Injury rates
Australia	Franklin et al, 2001	Analysis of data provided by the coronial files	373 unintentional work-related fatalities	▪ Fatality rate: 20.6/ 100,000 agricultural workers with males comprising 95% of all agricultural work-related deaths
Australia	Low et al, 1996	Telephone survey, using a stratified random sample	A sample of 919 sheep/wool, beef cattle and dry land broad acre cropping farms from three shires in the wheat/sheep belt of New South Wales	▪ 1 in 5 farms reported at least one injury per year, while 1 in 12 farms reported at least one serious injury per year. Animal- related injuries were the largest major category for agent of injury. ▪ Risk factors for injury occurrence were age, previous injury status, body mass index, hours of sleep, a variable measuring daytime drowsiness and a variable measuring perceived stress
Australia	Mather and Lower, 2001	Analysis of data from a retrospective questionnaire covering the previous 2 years	Members of the Tasmanian Farmers and Graziers Association	▪ 38% of the sample (n=506) had sustained at least one injury on their farm during 2 year period. ▪ The sheep industries bear a disproportionate amount of the injury burden (30.5%) within the Tasmanian agriculture.
Canada	Pickett et al, 1995	Population-based mail survey of 2,000 farms	4,110 farm persons	▪ Crude farm injury rate: 5.8 per 100 persons per year. ▪ High injury rates were observed in the male 31-40 age group (12.2 per 100 persons per year). ▪ Less than 10% of injuries were reported to the provincial workers' compensation board.
Canada	Pickett et al, 1999	Epidemiologic analysis of data from the Canadian Agricultural Injury Surveillance Program	503 Canadians who died from work-related farm injuries between 1991 and 1995	▪ Overall annual rate: 11.6 deaths per 100,000 farm population
Canada	Voaklander et al., 1999	Epidemiologic analysis of data from the Canadian Agricultural Injury Surveillance Program	183 farmers aged 60 and older who died from work-related injuries from 1991 through 1995	▪ Overall mortality rate: 32.8 per 100,000 population per year; almost all of those who died (98%) were men

Table 3 (1). continued

Canada	Hartling et al, 1997	Evaluation of hospital costs associated with agricultural machinery injuries in Ontario	Costs of hospitalized farm injuries, 1985-93	▪ The farm injury costs ranged from $768 to 62643$ and totaled $6.9 million over the study period. ▪ Males accounted for 89.8% of the total costs. ▪ Tractor injuries accounted for a large proportion of costs (34.4%). ▪ The median costs per case varied by type of machinery, ranging from $2043 for ploughs/disks to $3366 for augers.
Canada	Brison, 1992	1 year prospective survey	117 beef and dairy farms from eastern Ontario	▪ Farm injury rate: 7.0 persons injured per 100 person-years. ▪ Common patterns of injury included accidents caused by farm machinery, accidental falls, and injuries caused by animals. ▪ 46% of the farm-related injuries were treated in a hospital- based emergency department
Denmark	Rasmussen et al, 2000	Weekly registration of injuries during one year	A representative sample of 393 farms in one county	▪ The overall injury rate: 23.6 per 100,000 working hours ▪ The highest injury rate was recorded in swine farms (33.1) ▪ Overall, farm injuries occur among 32% of full-time farmers and farm laborers each year.
Denmark	Carstenson et al, 1995	National statistics		▪ Agriculture is among the most dangerous trades in Denmark with an incidence rate of fatalities of 10-14 per 100,000 person-years, four times higher than the mortality rate in the working population in general
Europe, overall	Dupre, 2001	Analysis of EUROSTAT data from 1998- 1999	All occupational injuries recorded by EUROSTAT	▪ In 1999, more than 370,000 accidents with more than 3 days' absence from work were recorded in agriculture, hunting and forestry, corresponding to an incidence rate of 7.510 per 100,000 workers ▪ Fatal work accidents accounted for a number of 631 deaths of employees in these domains, with a mortality rate of 12.4 per 100,000 workers in 1998.

Table 3 (2). continued

Finland	Virtanen et al, 2003	National Register linkage study, 1996-1997	National cohort of 69,629 full time-farmers	▪ Incidence: 5.8 per 100 person-years for women and 9.1 for men, respectively ▪ Hog and cattle farms had the highest injury rate (9.7 and 8.7 respectively) ▪ Finnish speakers had a higher rate than Swedish speakers (8.0 vs. 6.5)
France	No authors listed, Mutual Society of Agriculture Report, 2000	Analysis of data on farm injuries	All farm injuries recorded during 1976-1998	▪ 47,557 agricultural work accidents were recorded during a three-year period (1996-1998), 5,636 serious injuries and 219 fatalities
Greece	Alexe et al, 2003	Analysis of data recorded by the Emergency Department Injury Surveillance System	Persons sustaining work or non-occupational farm injury during a 5 year period (1996-2000)	▪ A number of 4,326 unintentional farm injuries have been recorded; ▪ They were frequently serious and required hospitalization. ▪ Farm injuries show distinct patterns among older women (lower limb fractures), young individuals (non traffic vehicle related injuries) and migrant workers (injuries from cutting and piercing instruments, falls from high level and bites)
Spain	(Sese et al, 2002).	Analysis of national statistical data		▪ there were almost than 610,000 occupational injuries causing absence from work for more than 3 days during 1997. Out of them, 1058 were fatal, 10.1% of them occurring in agriculture.
Sweden	Nordin& Bengtsson, 2001			▪ 667 occupational injuries were recorded in agriculture and hunting during 1999, corresponding to an incidence rate of 2.8 per 1,000 workers. Out of these, 13 were fatal, fact that defines the agriculture as the branch of activity with most fatal occupational accidents.
USA	Rautianen et Reynolds, 2002	Review	National coverage of agricultural workers	▪ Fatality rate in agriculture: 22 per 100,000 workers through 1990s ▪ Farm injury rate varies from 0.5 to 16.6 workers across the US ▪ Tractor were the main source of death, causing 300 fatalities per year

Table 3 (3). continued

USA	Hard et al, 2002	Analysis of national data from the Census of Fatal Occupational Injuries (CFOI), Traumatic Injury Surveillance of Farmers (TISF), and Regional Rural Injury Studies I and II (RRIS-I and RRIS-II)	National coverage of agricultural workers	▪ Fatality rate in agriculture (1992-1998): 25.8 per 100,000 workers ▪ Non-fatal farm injury rate: 7.5 per 100 workers ▪ Tractors: the leading cause of farm related death ▪ Elderly: increased risk for sustaining farm fatalities
USA	Richardson et, 1997	Review of medical examiner reports and death certificates were reviewed for all fatal agricultural injuries (1977-1991)	Farm workers in North Carolina	▪ Crude mortality rate for farmers: 38 per 100,000 worker-years ▪ Crude rate for farm laborers was 16 per 100,000 worker-years ▪ 54% of the fatal injuries were due to tractors
USA	Crandall et al, 1997	Review of medical examiner data for all occupational injury deaths in New Mexico from 1980 to 1991	Farm workers in New Mexico	▪ Mortality rate: 21.3 per 100,000 worker- year ▪ Farm workers were 4 times more likely than non-farm worker to die from occupational injury ▪ Older people had an increased risk of fatal farm occupational injury ▪ Crush injuries accounted for half of all farm injury deaths, half of these involving a tractor rollover
USA	Myers and Adekoya, 2001	Analysis of data from Vital Statistics Mortality and National Occupational Mortality surveillance systems	550 total on-farm fatalities to youth 16-19 years of age in the VSM, and 221 occupational on-farm deaths from the NTOF for the same age group	▪ 40% of the on-farm deaths were occupational ▪ on-farm occupational fatality rates dropped dramatically (12.0 deaths/100,000 for 1982-1985 down to 4.9 deaths/100,000 for 1991-1994)
USA	Heyer et al, 1992	Workers' compensation data were used to evaluate occupational injuries among children in Washington State from 1986 through 1989	A total of 16,481 claims filed by children under age 18 were evaluated.	▪ Farm workers accounted only 7% of all claims; they made up 36% of claims filed by children under age 14, and 17% of claims filed by children aged 14 or 15. ▪ Injuries classified as serious accounted for 26% of farm worker claims compared with only 16% of all claims filed by children.
USA	Hwang et al, 2001	Analysis of data from the telephone interview portion of the New York State Farm Family Health and Hazard Surveillance	1706 participants that reported all injuries over a 12-month period.	▪ Incidence of having sustained a severe farm injury during 1 year of follow up: 9%

Table 3 (4). continued

USA	Lewis et al, 1998	Analysis of work-related injuries among farm operators	390 principal farm operators from Iowa (Iowa Farm Family Health Surveillance Project)	▪ 10.3% of farm operators reported sustaining and injury ▪ Risk factors for farm injury were: younger age (OR 3.1), having and impairment or health problem that limits work (OR 2.4) and hand or arm exposure to acids or alkalis (OR 2.6)
USA	Park et al., 2001	Population-based, prospective study	290 Iowa male principal farm operators	▪ Cumulative one-year incidence of farm work-related injury was 10.5%.
USA	Lyman et al, 1999	Survey	310 active male farmers in nine rural counties in Alabama and Mississippi	▪ 23.4% of the farmers had a prior injury. Prior injury was more frequent among white owner/operators (29.1%), compared with black workers (18.9%), and black owner/operators (15.2%)
USA	Browning et, 1998	Analysis of data from the Farm Family Health and Hazard Surveillance Study	Population based study during a one- year period in a sample of 998 farmers aged 55+	▪ Crude injury rate: 9.03 per 100 farmers ▪ Leading external injury causes: falls (24.9%), machinery (22.5%), wood- cutting (14.6%) and animal related events (14.3%) ▪ Increased injury risk among farmers working with cattle and tobacco and farmers reporting a prior injury
USA	Dunn et al, 1993	Analysis of files from the North Carolina Office of the Chief Medical Examiner	71 persons younger than 20 years old who died from and had a job in North Carolina between Jan.1980- Dec 1989	▪ Cases were disproportionately male (90%), white (80%), and injured during June, July, and August (44%). ▪ Farm or field was the most frequent place of injury (27%). More than 50% of injuries involved a motorized vehicle, frequently a tractor.
USA	Hwang et al, 2001	Telephone interview, New York State Farm Family Health and Hazard Surveillance	1706 participants from New York state farms	▪ Incidence of severe injuries: 9% ▪ Risk factors for sustaining at least one severe farm injury: younger age, the presence of hearing loss or joint trouble, working more hours per day, being the owner/operator of the farm, and being from a farm with higher gross sales
USA	Munshi et al, 2002	Survey	2,250 adolescents from 6 high schools in Minnesota	▪ Annual injury rate for farm workers: 25.9/100 full time equivalents

Table 3 (5). continued

USA, Ohio	Crawford et al, 1998	Cross sectional case control study	The cases series consisted of 90 white male principal operators (POs) injured doing farm work in the 12 months prior to questionnaire completion. Controls consisted of 1,475 white male POs who reported no injuries	▪ The overall rate of injury was 5 per 100 person-years.
New Zealand, Southland	Firth et al, 2001	Cross-sectional study of a random sample of farmers in Southland	586 individuals working in farms	▪ The prevalence of at least one injury in the last twelve months which prevented normal farm work: 17.1%.
USA, Texas and Louisiana	Carruth et al., 2001	Population-based retrospective study	1096 actively working farm women in Texas and Louisiana	▪ Cumulative one-year incidence of farm injuries for women was 5%

RISK FACTORS FOR FARM INJURIES

According to a recent Farm Structure Survey 13,7 million persons work regularly or permanently in agriculture of the European Union (EU-15). The majority of them (almost 12,2 million) are farming family workers, and 62% of them are male farmers. About 11% of the total farm labor force is non- family. (Linares, 2003)

The literature review revealed several potential *risk factors*, including gender, age, health condition, educational level and prior experience of the farmer, the size of the farm, using heavy machinery or tools, breeding animals, the exposure to biochemical agents, being occupied full or part- time with the farming.

Summarizing, *male farmers* had higher injury rates than women (Virtanen, 2003). Consequently, farm injuries among male farmers represented over three quarters of the total costs. (Hartling, 1997) Male farmers were more likely to use all terrain vehicles than townspeople or rural non- farmers and they were significantly less likely to wear their seatbelts than townspeople. (Zwerling, 2001) Male agricultural workers sustained the majority of farm related deaths (95%) with a fatality rate varying from 11.6 to 32.8/100.000 (Franklin, 2001, Pickett, 1999, Voaklander, 1999). However, in a Greek survey, one of the farm injury patterns revealed by the logistic analysis was referring to older women, suffering mostly from lower limb injuries. (Alexe, 2003)

Concerning the age of farmers, *older farmers* were at the highest risk for farm fatalities (Hard, 2002) although, in other studies, younger ages of workers were found to be associated with a higher injury risk (Lewis, 1998) When concerning fatal injuries, studies referred an average age of 35 to 40 yrs. old. (Richardson, 1997)

According to a recent study, half of farm decedents were 50 years of age and older, one- third were 60 years of age and older. (Crandall, 1997) High injury rates were observed in the group of males aged 31-40 yrs.: 12.2 per 100 persons per year. (Pickett, 1995) Persons less than 50 years old had slightly less than a doubled risk compared with those over 50 years of age. (Rasmussen, 2000)

The representation of *elderly people in EU* among farming family workers is very high. Approximately a quarter of the total labor force is over the usual age of retirement, namely over 65 years old, while the share of young people less than 35 years old is around 18%. In Southern European countries, the proportion of people aged 55 years or more surpasses 40% (in Portugal, Greece and Italy around half of the population is in this age group). In the remaining EU countries this share is high- over 30%- and with the exception of Finland, this proportion is greater than that for people aged less than 35. In Spain, Italy, Greece and Portugal the proportion of women of at least 65 years is greater than that of women younger than 35. (Linares, 2003)

*Animal related wo*rk was the most common farm injury mechanism. (Rasmussen, 2000, Low, 1996) The sheep industries bear a disproportionate amount of the farm injury burden (Mather and Lower, 2001) Dairy and hog farming were the riskiest

activities. (Virtanen, 2003) Farmers who were working on farms with beef cattle had statistically significant increased risk for a farm related injury. (Browning, 1998)

Among the total farming injury events, one out of five were related to large machinery use. (Gerberich, 1998) The majority of injury events occurred while farmers were lifting, pushing, or pulling (21%), adjusting the machine (20%) or repairing the machine (17%). Tractor farm injuries accounted for a large proportion of the total costs, almost one third. (Hartling, 1997) Tractors were the leading source of death, causing approximately 300 fatalities each year. (Rautianen, 2002). According to a recent study, 54% of the fatal farm injuries were attributed to *tractors' use.* (Richardson, 1997) About 77.6% of all incidents were due to farm machinery. Most of the fatal incidents were attributed to tractor's use. (Tiwari, 2002). (Franklin, 2001) Crash injuries appeared to be a major injury mechanism, accounting for half of all farm injury deaths, half of these involving a tractor rollover. (Crandall, 1997) The majority of injury events took place while persons were mounting or dismounting the tractor (42%) (Lee, 1996) Leading mechanisms of fatal injuries included tractor rollovers, being struck or crushed by objects, and being run over by machinery. (Hard, 2002, Voaklander, 1999) Besides tractors, farm cars are often involved in fatal farm injuries. (Rasmussen, 2000)

Prior injury was more frequent among white owner/operators (29.1%) compared with black workers (18.9%) and black owner/operators (15.2%) (Lyman, 1999) Through multivariate logistic models it was found that increased farm work experience is predictive of farm injury occurrence. (Brison, 1992)

Migrant farm workers were found to be a vulnerable population group to farm injuries, particularly in countries where they consisted a significant part of the handwork labor. (Alexe, 2003)

The presence of *hearing loss or joint trouble* was a significant risk factor (Granklin, 2001) Through logistic regression it appeared that having an impairment or health problem was significant injury risk factor. (Lewis, 1998) Farmers who reported a prior injury that limited their ability to farm were at increased risk for a farm related injury. (Browning, 1998)

Working more hours per day was a significant risk factor. (Franklin, 2001) Increased farm injury incidence rates were associated with increased working hours per week. (Gerberich, 1998). The number of hours worked per week was significantly associated with an increased risk of machine- related farm injury. (Layde, 1995) Tractor related farm injuries increased incrementally for those persons working between 60 to 79 hours per week. (Lee, 1996) The risk of fall- related occupational injuries on farms increased 2% per hour worked. *Full time farming* seemed to be associated with higher injury risk. Farm injuries occurred among one third of full time farmers. (Rasmussen, 2000) In multiple logistic regression analyses full-time farming was associated with farm injury. (Lyman, 1999) (Brison, 1992) Furthermore, being the owner or the operator of a farm was a significant risk factor. (Franklin, 2001) Farm owner/ operators accounted for 82.8% of the deaths. (Voaklander, 1999) The injury risk seemed to be relevant with the size of the farm and the burden of the farm work need to be done; e.g. Large farms were associated with an increased risk of injury.

(Layde, 1995) The injury risk increased with the number of dairy cows. (Virtanen, 2003)

In multiple logistic regression analyses *alcohol consumption* was associated with farm injury. (Lyman, 1999) One in five farm injury deaths involved alcohol. (Crandall, 1997) Other studies indicated that the use of prescription medications in farm owners was predictive of farm injury occurrence. (Brison, 1992) Moreover, exposure to acids, alkalis or other biochemical was a significant injury risk factor. (Lewis, 1998)

Farmer's *educational leve*l and the seasoning were mentioned in few studies as variables associated with higher farm injury risk. In particular, post- high school education was associated with prior farm injury, (Lyman, 1999) -summer and autumn had a double relative incidence rate compared with winter and spring. (Rasmussen, 2000)

FARM INJURIES AMONG CHILDREN

Despite increasing attention to farm related child injury, the literature continues to report primarily descriptive studies that rely in small samples focusing on the nature of the injury event and immediate consequences. There are not sufficient epidemiological data regarding disability among children who experienced agricultural injury (Reed, 2000).

The rate of nonfatal farm injuries has increased; approximately 100 unintentional injury deaths occur annually to children and adolescents on US farms, and an additional 22,000 injuries to children younger than 20 years occur on farms. Compared with other types of industry, relatively few adolescents are employed on farms, however, the proportion of fatalities in agriculture is higher that that for any other type of adolescent employments (American Academy of Pediatrics, 2001).

The mean age of children that sustained farm injuries was 7,3 years, according to a Canadian study; male: female ration was estimated to be 2:1. The leading mechanisms of injury were: tractor (33%) animals (29%), other machinery (20%).

The predominant injuries were orthopedic (56%), neurological (42%) and thoracic-abdominal (22%) (Meiers, 2001). Another Canadian study showed that age specific injury rates ranged from 6,3-22,6/1000 persons years, peaking in 1-4 year olds. The most prevalent type of injury was the open wound of the head/ face region (17,1%),

followed by fractures/ dislocations to the upper extremities (14,9%). Although the injury mechanism differed by age group, falls and machinery constantly ranked in the top three (Bancej, 2000).

Farm injuries can cause injuries of varying severity to children or adolescents, which could lead to a permanent disability or death. In a study, performed in the USA, out of recorded 164 child farm injuries, 29 were fatalities, 18 were disabling, and 55% occurred while working. The leading injury types were run-over and overturn. Tasks such as loading hay, fieldwork with trailed implements, and feeding calves involved very young victims. Injuries involving non-powered wagons had the highest frequency of under-age victims (Mason, 2002).

Children less than 15 year old represented 20% of all unintentional farm-related fatalities in Australia, with children less than 5 years old accounting for 63% of all child fatalities. The majority of children were injured while bystanders to farm work and equipment used on the farm, with drowning the most common mechanism of fatalities among children less than 10 year old. Vehicle accidents were common for children aged 10-14 years old (Mitchell, 2001).

In a survey by Schulman et al, focused on farm- based hazard exposure, the group of farm-working teens was 72% male, had a mean age of 16,6; the respondents in this group said they are exposed to tractors, large animals, all-terrain vehicle, farm trucks, and rotary mowers, and reported exposure to pesticides and tobacco harvesters. The most common injuries included insect stings, cuts, burns, and falls (Schulman, 1997). A telephone survey, executed by Marlenga et al in USA, presented that the leading

categories of child farm work were animal care, crop management, and tractor with implement operation. A substantial proportion of children were assigned to farm work even in the youngest age group of 7-9 years. Males were differentially assigned to tractor with implement operations, while females were more often assigned to animal care. (Marlenga, 2001)

Table 4. Research overview of farm injuries among children

Author, date and country	Design	Variables	Partipants	Findings
Pryor et al, 2002 USA	Survey, Haddon's Injury Model	▪ farm childhood injuries ▪ type of supervision ▪ injury risk in relation to supervision	▪ 177 children (less than 18 years old) involved in farm works	▪ 32 children sustained at least one injury, and 8 sustained two injuries within one year from the time of survey ▪ 37 children needed medical attention for their injuries ▪ children were more likely to sustain farm-related injury when they were supervised by a caregiver engaged in farm work versus supervised at home (p=0.007).
Mason and Earle-Richardson, 2002 USA	The New York Community Partners for Health Farming surveillance (CPHF)	▪ farm injury type, severity, and risk factors	▪ 164 injured persons aged 1-18 years	▪ out of 164 injuries, 29 were fatalities, 18 were disabling, and 55% occurred while working ▪ leading injury types were run-over and overturns ▪ tasks of loading hay, fieldwork with trailed implements, and feeding calves more frequently involved very young victims ▪ injuries involving non-powered wagons had the highest frequency of under-age victims
Munshi et al, 2002, USA	Self-administrated survey	▪ adolescent work practices and injury incidence	▪ 2,250 students	▪ annual injury rates for students working in non-farm activities was 26,7/100 full-time equivalents); in farm only activities, injury rate was 25,9/100 full-time equivalents
Hubler and Hupcey 2002, USA	review of the weekly newspaper written by the Amish	▪ incidence and nature of farm injuries	▪ Amish children	▪ during a 5-month period, a total of 89 injuries, including 5 fatalities, were found; male children sustained 64 injuries, and female children sustained 25 injuries; ▪ falls were the most commonly reported mechanism of injury

Table 4 (1). continued

Mitchell RJ et al, 2002 Australia	analysis of coronial files for the period 1989-1992	▪ type and circumstances of unintentional farm related fatalities	▪ young and older adults in Australia that sustained farm unintentional fatalities	▪ young adults 15- 24 years sustained around 14% of all farm- related fatalities during the studied period and ¼ were older adults aged less than 56 years old ▪ young adults were commonly injured in motor vehicle incidents and in events involving firearms ▪ tractors were the most common agent involved in fatal incidence of older adults
Marlenga B et al, 2001, USA	telephone interview	▪ type of agricultural jobs performed by children	▪ 1,138 children from 498 North American farms	▪ a total of 2,389 jobs were reported; the leading categories of work were animal care, crop management, and tractor with implement operation. ▪ substantial proportion of children were assigned to farm work even in the youngest age group of 7-9 years ▪ males were differentially assigned to tractor with implement operations, while females were more often assigned to animal care
American Academy of Pediatrics. Committee on Injury and Poison Prevention and Committee of Community Health Services 2001				▪ the rate of nonfatal farm injuries has increased; approximately 100 unintentional injury deaths occur annually to children and adolescents on US farms, and an additional 22,000 injuries to children younger than 20 years occur on farms ▪ relatively few adolescents are employed on farms compared with other types of industry, yet the proportion of fatalities in agriculture is higher that that for any other type of adolescent employments.

Table 4 (2). continued

Mitchell et al, 2001 Australia	analysis of coronial files for the period 1989-1992	▪ type and circumstances of unintentional farm related fatalities	▪ 115 children less than 15 years old that sustained fatal farm injuries	▪ children less than 15 year old represent 20% of all unintentional farm-related fatalities in Australia, with children less than 5 years old representing 63% of all child fatalities. ▪ the majority of children were injured while bystanders to farm work and equipment used on the farm, with drowning the most common mechanism of fatalities among children less than 10 year old. ▪ vehicle accidents were common for children aged 10-14 years old.
Myers et Adekoya, 2001 USA	analysis of data from the Vital Statistics Mortality (VSM) files and from the National Traumatic Occupational Fatalities (NTOF)	▪ incidence and type of fatal farm injuries among youth 16-19 years old during the period 1982-1994	▪ 550 young people (16-19 years old) that sustained on-farm fatalities-recorded by VSM ▪ 220 occupational on-farm deaths from the NTOF	▪ 40% of the on-farm deaths were occupational; the proportion of deaths attributable to work increased with age. ▪ fatality rates for on-farm non-occupational deaths decreased slightly during the studied period from 8,4 deaths per 100,000 for 1982-85 to 6,8 deaths /100,000 from 1991-94, while on-farm occupational fatality rates dropped dramatically (from 12,0 deaths per 100,000 for 1982-85 to 4,9 deaths/ 100,000 from 1991-94 ▪ the leading causes of death for on-farm occupational fatalities were machinery (54%) and electrical current (20%) ▪ the most common causes of on-farm non-occupational fatalities were drowning (38,9%) and firearms (28,6%)

Table 4 (3). continued

Gerberich et al, 2001 USA	randomly selected farm household during 1990	▪	incidence and consequences of both farming and non-farming related injuries and potential risk factors	▪	children and youth aged 0-19 years old	▪	injury rates for farming and non-farming sources respectively were 1,683 and 6,980 per 100,000 persons. ▪ animals (40%) were the primary sources of the farming operation related injuries; sport/ recreational sources (61%) were associated primarily with non-farming related injuries. ▪ of the farming and non-farming operation related injury cases, 83% and 90% respectively required some type of health care; moreover, 17% and 24%, respectively, were restricted from regular activities for one month or more. ▪ important risk ration were observed for operating a tractor, working with dairy cattle, and being male.
Meiers and Baerg J, 2001 Canada	review of all childhood farm injuries referred to a trauma center	▪ ▪	type of childhood farm injury risk factors	▪	45 children under 19 years of age that sustained farm injuries	▪	mean age of children that sustained farm injuries was 7,3 years; male: female ration was 2:1. ▪ 14 fatalities were recorded ▪ the leading mechanisms of injury were: tractor (33%) animals (29%), other machinery (20%) ▪ most deaths involved tractors and machinery (67%) ▪ predominant injuries were orthopedic (56%), neurologic (42%) and toraco-abdominal (22%)
Fisher et al, 2001 USA	survey of teachers in Amish schools	▪	investigation of farm injuries among Amish children	▪	teachers in Amish schools	▪	70% of the teachers reported a childhood farm injury in their family, with the majority attributing this to farm animals.

Table 4 (4). continued

DeMuri and Purschwits, 2000 USA	review	▪ epidemiology, pathogenesis and prevention of farm injuries in children and adolescents			▪ In Wisconsin, 39 children were killed in the agricultural setting between 1995 and 1999. ▪ Nationwide, over 100 children per year are killed and 27,000 injured on farms ▪ the age distribution of farm injuries in children is bimodal, with one peak at 3-4 years of age and the second peak at 13-16 years ▪ boys are more likely to be injured than girls ▪ on the agents associated with the injury of children, tractors are most commonly implicated and are the most fatal; drownings, injury by cows and horses, and other farm implements and machinery make up the remainder of most farm accidents.
Bancej and Arbuckle, 2000 Canada	mailed survey	▪ childhood farm injury rates, patterns, and risk factors	▪ 1,765 full time operated Ontario farms with a husband-wife couple where the wife was of reproductive age		▪ age specific injury rates ranged from 6,3-22,6/1000 persons years, peaking in 1-4 year olds. ▪ open wound of the head/ face region were the most prevalent type of injury (17,1%), followed by fractures/ dislocations to the upper extremities (14,9%) ▪ mechanism differed by age group. though falls and machinery constantly ranked in the top three.
Reed and Claunch, 2000, USA	review				▪ despite increasing attention to farm related child injury, the literature continues to report primarily descriptive studies that rely in small samples focusing on the nature of the injury event and immediate consequences. ▪ very little was found regarding disability among children who experienced agricultural injury.

Table 4 (5). continued

Zietlow and Swanson, 1999 USA	analysis of data from a trauma center	▪ pattern of farm injury, injury characteristics	▪ 143 children and adolescents less than 18 years old that were admitted for a farm- related injury to the respective trauma center	▪ there was a predilection for fractures, amputations, head injuries, and soft- tissue infections ▪ severe permanent disability was present in one-third on children
Schulman et al, 1997 USA	survey	▪ farm- based hazard exposure, farm injury experiences	▪ random sample of working teens (aged 14 to 17) in North Carolina	▪ the group of farm-working teens was 72% male, had a mean age of 16,6; ▪ the respondents in this group said they are exposed to tractors, large animals, all-terrain vehicle, farm trucks, and rotary mowers, and reported exposure to pesticides and tobacco harvesters. ▪ common injuries included insect stings, cuts, burns, and falls

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DEVELOPMENT OF AN INVENTORY OF EXISTING FARM DATA SOURCES

INTRODUCTION

Undoubtedly, farm injuries constitute a significant type of injury that may lead to severe outcomes for the victim. Therefore, it is essential for Public Health systems to run and continuously update farm injury databases, in order to control and identify the farm injury trends and set up prompt preventive strategies. According to our knowledge, farm injuries are not recorded as a specific type of injury in WHO injury databases and, in EUROSTAT, only occupational farm injuries are recorded. It is worth noting that EUROSTAT database only register farm injuries with a significant grade of severity, that require absence from work of at least 3 days, while those accidents of slighter severity are missed. Significant variables, necessary for interpreting the pattern of injury event i.e. mechanism of injury, object involved, are not usually recorded. On the other hand, an important injury surveillance system has been developed and maintained at EU level, the Injury Data Base (IDB, former EHLASS) that covers leisure injuries in participating EU countries.

During this phase of the Project, the main goal was the exploration of data sources covering farm injuries in participating countries, for complementing the information provided by former EHLASS database (currently called Injury Data Base- IDB). For this purpose, data sources were sought in each participating country, identified and assessed in terms of

strengths and weaknesses, in order to assess their quality and comparability in regards to IDB.

METHODOLOGY

A special questionnaire concerning the existing farm data sources in each of collaborating countries has been developed and distributed to partners for critical comments and suggestions. After brainstorming, the final version of the questionnaire was distributed to partners for completion. Most collaborators have been able to provide the information requested. When necessary, the data were complemented with the information gathered through an in-depth research of the Internet web sites concerning farm injuries.

This uniform questionnaire was conceived in an appropriate way to harvest relevant data about the name of farm injury data source and the responsible organization, type of injuries (leisure, occupational, other), methodological characteristics (setting, coverage, validity, reliability, representativeness, recorded variables, and coding systems). The questionnaire is presented in detail in **Annex 5**.

RESULTS

The participants from Austria, Denmark, France, Greece, Portugal, Sweden and the Netherlands completed the questionnaire and the results are presented in detail in Table 5.

In *Austria,* occupational farm injuries are well documented through data collected by the

Farmer's Compensation Board Statistics, run by the Farmer's Social Insurance. Fatal and non-fatal injuries occurring in farms are recorded. Farm injuries during leisure time are recorded by Austrian EHLASS database (IDB), which records fatal and non-fatal injuries. Both systems have national coverage and the validity/ reliability and representativeness of data are considered good. Moreover, IDB offers detailed socio-demographic information, as well as details about the mechanism of injuries, injury resulting from the accident, outcome and therapy. Accidents that take place in farms can be easily retrieved from this database using codes that concern the setting of injuries (defined as "farm"). In contrast, the Austrian National Mortality database and National Patient Register do not offer specific information concerning farm injury events (data not shown).

In Denmark, the National Patient Register and the Mortality Register, run by the National Board of Health, record both occupational and non-work related injuries of permanent residents. The coverage is national and data are representative. However, data from the Mortality Register have no specificity for farm injury data because of the coding system used (ICD). The National Patient Register in Denmark records variables concerning the role of the injured person in the farm i.e. resident of farm/non-worker and worker. In both systems information about the diagnosis and the treatment required are included.

Statistics Denmark runs the Occupation & Mortality Register, the Danish Prevention Register and Occupation & Hospital admission Register. They all record occupational injuries, whereas the Danish Prevention Register records also non-work ones, therefore it includes injuries sustained by residents or visitors of farm areas. They are individual based registers

(data linkage from the Central Person Register, Population Census, etc), representative for the country. They refer to people 15-74 years old, with residence in Denmark and include several variables concerning the injury event and its outcome (date, time, place of injury, diagnosis, type of required treatment). The Danish Labor Inspectorate runs the Register on Occupational Accidents, which records fatal and non-fatal ones, as reported by the employer. Although it has national coverage, it is not representative, since it is estimated that it records about 50% of all occupational injuries. The coding system used is made by this authority and specifies the age, gender, place of residence, marital, educational and occupational status of the injured person, place and type of employment, size and type of the industry. It also records variables referring to the mechanism of injury and the objects involved in it, type of injury, injured body part but not for the required treatment. Finally, the Injury Register, run by the National Institute of Public Health, records both occupational and non-work related injuries of persons contacting Emergency Departments of 5 hospitals. It covers 15% of the total Danish population, providing representative data for the country.

In France, the Mutualitè Sociale Agricole (MSA) records fatal and non-fatal occupational farm injuries. It has national coverage and includes information concerning the type of farm occupation, the injury mechanism, the injured body part and its outcome. However, the data are not available for research purposes. Non-work related farm injuries in France are recorded by IDB. Data from the Emergency Departments of six hospitals are collected providing evidence for farm injuries during leisure time. The data are not representative for the whole country but can be used for scientific purposes. Mortality Register and Patient Register are, of course, available in France, but there is lack of specificity concerning farm injuries (data not shown).

In Greece, occupational farm injuries are recorded by the Ministry of Labor and Social Affairs (Directorate of Working Conditions) and by the National Organization for Public Insurance, Department of Research and Statistics. They both have national coverage and provide representative data for the country, especially for the severe and fatal farm injuries. In the former, data are collected through a compulsory report by the employer and, in the latter, via a special form filled in by the staff. The Mortality Register and the Social Welfare and Health Statistics, run by the National Statistical Service of Greece record both occupational and non-work related injuries (data not shown). They provide representative data for the country but no specific for farm injuries because of the coding systems used. The Emergency Department Injury Surveillance System (EDISS- that reports data to IDB), run by the Center for Research and Prevention of Injuries (CEREPRI), records both leisure and occupational farm injuries. Specially trained health visitors collect information for the injury event by using a pre-coded questionnaire. Four hospitals participate in this network, providing reasonably representative data for the whole country. This surveillance system provides valuable information for the epidemiological pattern of farm injuries in Greece, and its continuously updated data are being used for scientific purposes (publications in peer-reviewed journals, presentations in scientific forums etc.).

In the Netherlands, occupational and non-work related injuries are recorded by the Registration of Severe Occupational accidents (run by Labor Inspectorate, Department of Ministry of Social Affairs and Employment), the Dutch Etiological Database, the Dutch Newspaper Clippings and the Dutch Injury Surveillance System- LIS (all run by the Consumer Safety Institute). Fifteen hospitals participate in LIS, providing representative data

for the pattern of farm injuries in the country. The data are collected via forms filled by the receptionists of the hospital administration.

In Sweden, the Swedish Occupational Injury Information System (ISA), run by the National Board of Occupational Safety and Health, records fatal and non-fatal occupational injuries. The system has national coverage, providing representative view of the occupational injuries in the country. Farm injuries during leisure time are recorded by EHLASS. In a network of 3 hospitals and 1 outpatient clinic, data of good validity and reliability but not representative for the whole country are collected.

In Portugal, from 2002 injuries during leisure time are collected by ADÉLIA (Acidentes Domésticos e de Lazer: Informação Adequada), run by National Health Observatory of the National Health Institute Dr. Ricardo Jorge, Lisbon. Special trained personnel execute face-to-face interviews with the injured person at emergency units and injury departments in a sample of 12 hospitals and 8 health centers. All ages and the 5 regions of Portugal are represented. Nevertheless, the coverage is lower in the big urban centers, because of the lower participation of central hospitals. The collected data are not used for scientific purposes.

DISCUSSION

Overall, important gaps concerning the documentation and assessment of farm injuries have been identified in some participating countries. Mortality or Patient Registers do not explicitly code farm injuries, so that these accidents- otherwise covered in the main

categories of "accidents"- cannot be specifically retrieved from these national data sources. Moreover, the E-code, that is usually used for classification of external causes of death, does not offer information about the place of injury or the mechanism, so that farm injury data cannot be specifically retrieved.

Farm occupational injuries- usually those that require a minimum of 3 days absence from work- are specifically addressed in participating EU countries- as these data sources gather data for insurance purposes. As data concerning occupational injuries, in general, are specifically

collected and reported uniformly to EUROSTAT by each EU country, the reliability of this information is high.

A particular situation is that of persons living and working in farms after their retirement. They are not considered "farmers", according to the classification of occupations, so that those accidents that occur during their involvement if farm activities usually go misclassified as "leisure injuries". This is in part because of the definition of "occupational injuries" as those occurring to persons that are specifically hired to perform a specific task. By exclusion, all other accident, when not unintentional or traffic related- are leisure time injuries.

At European level, recommendations should be given for implementing specific protocols and forms in medical settings for identifying and appropriately recording farm injuries. Uniform high quality coding systems should be used at EU level, which is a necessary condition for studying and comparing data concerning farm injuries from different countries. A recommendation should be specifically made when concerning *farm occupational injuries*-

so that their classification will be made based on: 1. *job* of the persons involved in the accident and whether the injury occurred during work time (as it is currently coded by different Labor Surveillance Systems in participating countries); and 2. *specific activity* (farm occupational activity during leisure time), so that a demarcation could be made to specifically "isolate" pure leisure injuries from those related to farm occupational activities.

The implementation of a common Injury Database, including variables concerning the injured person in the farm area, the circumstances under which farm injuries occur, the injury mechanism and its outcome, is necessary for dealing efficiently with this significant issue of Public Health.

Table 5.1: Summary results of the questionnaire regarding the farm injury data sources in **Austria** and **Denmark**

Country	**Austria**				**Denmark**		
Data source	**Farmer's Compensation Board Statistics**	**Austrian EHLASS (current IDB)**	**National Patient Register**	**Mortality Register**	**Register on Occupational Accidents**	**Occupation & Mortality (data linkage)**	**Danish Prevention Register (data linkage)**
Responsible Organization	Farmer's Social Insurance	Sicherleben Institute	National Board of Health	National Board of Health	Danish Labor Inspectorate	Statistics Denmark	Statistics Denmark
Type of farm injuries	Occupational: ➧fatal ➧non-fatal	Home and leisure injuries: ➧fatal ➧non-fatal	Occupational/ Non-work related: ➧non-fatal	Occupational/ Non-work related: ➧fatal	Occupational: ➧fatal ➧non-fatal	Occupational: ➧fatal	Occupational/ Non-work related: ➧fatal ➧non-fatal
Setting	Workplace	Hospitals	Hospitals	Mortality register based on certification of death	Workplace (individual based register based on employer's reporting)	Individual based register (data linkage from the Central Person Register, Mortality Register and Population Census)	Individual based register (data linkage from the Central Person Register, Mortality Register, Population Census, National Occupational Register, etc.)
Population	Injured persons and their family members	In and out-patients	Persons with residence in Denmark	Persons with residence in Denmark	Persons with residence and occupation in Denmark	Persons aged 15-74 yrs. with residence in Denmark	Persons with residence in Denmark
Coverage	National	7 hospitals	National	National	National	National	National
Validity and reliability	Good	Good	Good (specificity for farm injury data may be lower because of the coding system)	Good (no specificity for farm injury data because of the coding system)	Good	N.A.	N.A.
Representativeness	Yes	Yes	Yes (National register)	Yes (National register)	50% of occupational injuries (under-representation)	Yes (National register)	Yes (National register)
Data collection	➧Medical Records/	➧In person interviews with the injured person	➧Medical records (discharge data)	➧Death certificate	➧Report by employer to the Labor Inspection (special format)	➧Death certificate	➧Data linkage of individual based register

TABLE 5.1 (1) CONTINUED

Country	**Austria**				**Denmark**		
Coding system	➧National Codes of Classification	ICD9, EHLASS 96	➧NOMESCO, MDS, ICD-10	➧ICD-10	➧Coding system made by authority	➧ICD-10	➧NOMESCO, MDS, ICD-10
Variables/ injured person	Age, gender, place of residence	Age, gender	Age, gender, place of residence,	-	Age, gender, place of residence, occupational status, place of work, type of employment, size and type of industry	Age, gender, place of residence, size of family/ household, marital status, occupational status, place of work, educational status	Age, gender, place of residence, household size, marital status, occupational status, place of work, educational status, social class, income, type of employment, duration of unemployment
Role of the injured person in the farm	➧Full time farmer ➧Part time farmer ➧Farmer's family member	-	➧Worker ➧Resident of farm area ➧Non-worker	-	➧Worker ➧Date of employment	➧Worker	➧Worker ➧Resident of farm area ➧Non-worker
Injury event	Place of injury, injury mechanism, month of accident	➧Day/ time/ place of accident, mechanism, activity, objects involved, accident description (free-text, in Austrian)	➧Place of injury, injury mechanism (1st level of NOMESCO codes), date of the accident ➧Occupational or other injury	➧Occupational or other injury, intentional manner of death	➧Date/time/place of accident, mechanism of injury, products involved	➧Occupational or other injury, intentional manner of death ➧ Date/time/place of accident	➧Occupational or other injury ➧Place of injury, injury mechanism (1st level of NOMESCO codes), date of the accident
Diagnosis	Type of injury, injured body part, number of injuries	Type of injury, part of body injured	ICD-10 diagnosis	ICD-10 diagnosis	Type of injury, injured body part	ICD-10 diagnosis	ICD-10 diagnosis
Treatment	Type of treatment	Type of treatment, days of hospitalization	Date of admission/ discharge, ED treatment, type of treatment, follow up	Surgical procedures related to the death certificate (e.g. surgery performed during admission prior to death)	-	Surgical procedures related to the death certificate (e.g. surgery performed during admission prior to death)	Type of treatment and follow up
Other variables	-	-	-	-	-	-	-
Data availability	N.A.	Yes (in special circumstances)	Yes (in special circumstances)	Yes (in special circumstances)	Yes (in special circumstances)	Yes (in special circumstances)	Yes (in special circumstances)

Table 5.2: Summary results of the questionnaire regarding the farm injury data sources in **Denmark, France and Greece**

Country	**Denmark**		**France**		**Greece**	
Data source	**Injury Register**	**Occupation& Hospital admission**	**Mutualité Sociale Agricole (MSA)**	**European Home and Leisure Accident Surveillance System (EHLASS- current IDB)**	**Emergency Department Injury Surveillance System (EDISS)**	**Social Welfare and Health Statistics**
Responsible Organization	National Institute of Public Health	Statistics Denmark	Mutualité Sociale Agricole (MSA)	EHLASS (IDB)	Center for Research and Prevention of Injuries among the Young (CEREPRI)	National Statistical Service of Greece, Department of Social Statistics (NSSG)
Type of farm injuries	Occupational/ Non-work related: ➧non-fatal	Occupational ➧non-fatal	Occupational: ➧fatal ➧non-fatal	Non-work related farm injuries: ➧fatal ➧non-fatal	Occupational/ Non-work related farm injuries: ➧fatal ➧non-fatal	Occupational/ Non-work related: ➧non-fatal
Setting	Emergency Departments in 5 hospitals	Individual based register; (data linkage from the Central Person Register, National Patient Register, Population Census and National Occupational Register)	Workplace	Emergency Departments in 6 hospitals	Emergency Departments in 4 hospitals	Hospitals
Population	Persons contacting ED	Persons aged 15-74 yrs. with residence in Denmark	All farm workers and farmers	Persons contacting ED for injury reasons	Persons contacting ED for injury reasons	All patients attending the hospital
Coverage	15% of Danish population	National	National	6 hospitals	4 hospitals	All Greek hospitals
Validity and reliability	Good	N.A.	Good	Good	Good	Good (no specificity for farm injury data because of the coding system)
Representativeness	Yes	Yes (National)	Yes (National register)	No	No	Yes (National Register- 25% sample)
Data collection	Medical records	Data linkage of individual based registers	➧Administrative questionnaire (compulsory declaration)	➧Standard EHLASS record	➧Standard pre-coded questionnaire	➧Special form edited by NSSG

TABLE 5.2 (1) CONTINUED

Country	**Denmark**		**France**		**Greece**	
Coding system	ICD-10, NACE (occupational coding for occupational accidents), NOMESCO	ICD-10, MDS, NOMESCO	NA	NA	ICD9, ICD10, EHLASS 96 and 2000, NOMESCO	ICD-9
Variables/ injured person	Age, gender, place of residence	Age, gender, place of residence, urbanization, marital status, occupational status, place of work, type of employment, duration of employment	Age, gender, place of residence	Age, gender, place of residence	Name, address, place of residence, telephone number, gender, date of birth, age, nationality, parental education, day and hour of visit of the A&E department;	Age, date of birth, gender, nationality, familial situation, profession, educational level, place of residence
Role of the injured person in the farm	➧Worker ➧Resident of farm area ➧Non-worker	➧Worker ➧Resident of farm area ➧Non-worker	➧Type of farm worker	-	-	-
Injury event	➧Occupational or other injury ➧Date/place of accident and attendance, mechanism of injury, activity	➧Occupational or other injury ➧Date/place of accident and attendance, mechanism of injury	➧Day of accident, injury mechanism	➧Day of accident, injury mechanism, place of accident, activity, product involved in the accident, free text description	➧Day/ time/ place of accident, mechanism, activity, objects involved, accident description (free-text, in Greek and key-words), supervision	➧date/time of accident, external cause, accident description, place of the accident
Diagnosis	ICD-10 diagnoses Type of injury, injured body part	ICD-10 diagnoses	Type of injury, injured body part	Type of injury, injured body part	Type of injury (up to 3 main injuries), part of body injured (up to 3 body parts)	ICD-9 diagnoses
Treatment	Date/ time of admission, ED treatment, date/ time of discharge, type of treatment and follow up	Date/time of admission and discharge, type of treatment and follow up	Treatment, sick leaves, duration of hospitalization, deceased, follow-up, complications, disabilities	Treatment, duration of hospitalization	Therapeutically procedures (first aids, radiology, narthex), follow-up treatment, date and time of attendance, length of stay	-
Other variables	-	-	-	-	Key words	-
Data availability	Yes (in special circumstances)	Yes (in special circumstances)	No	Yes (in special circumstances)	Yes (in special circumstances)	No

Table 5.3: Summary results of the questionnaire regarding the farm injury data sources in **Greece and Netherlands.**

Country	**Greece**			**Netherlands**		
Data source	**Work accident data**	**Data on work related injuries**	**Mortality Register**	**Registration of severe occupational accidents**	**Dutch Etiological Database**	**Dutch Newspaper Clippings**
Responsible Organization	Ministry of Labour and Social Affairs, Directorate of Working Conditions	National Organisation for Public Insurance (IKA), Department of Research and Statistics	National Statistical Service of Greece (NSSG), Service of Population	Labor Inspectorate, Department of the Ministry of Social Affairs and Employment	Consumer Safety Institute, Amsterdam	Consumer Safety Institute, Amsterdam
Type of farm injuries	Occupational: • severe non-fatal • fatal	Occupational: • non-fatal • fatal	Occupational/ non-work related: • fatal	Occupational/ Non-work related: • non-fatal • fatal	Specific injuries are analyzed • non-fatal • fatal	Occupational/ Non-work related fatal/ non-fatal: • HLA • Sports injuries • Traffic injuries • Violence • Self-mutilation
Setting	Workplace	Hospitals, IKA units	Mortality register based on certification of death	Compulsory report of accident to the Labor Inspectorate by the employers	EDs in LIS hospitals	Clippings are recorded by an external bureau from National and regional newspapers in the NL
Population	Persons with residence and occupation in Greece	Persons with residence, occupation and public insurance in Greece	Persons with residence in Greece	Employees, bystanders that were injured in an accident while being involved in a paid work activity	Victims of a specific type of an accident who are treated in a LIS hospital	Victims of HLA accidents and a sample of other accidents that are mentioned in newspapers
Coverage	National	National	National	National (for fatal accident); it may be underestimated for non-fatal farm injuries	LIS hospitals	All HLA accidents and a sample of other accidents mentioned in National and regional Dutch newspapers
Validity and reliability	Good	Good	Good	N.A.	N.A.	Good
Representativeness	Only for severe/fatal work injuries	Yes	Good (no specificity for farm injury data)	Yes (100% for fatal accidents in the population included); less representative for other non-fatal accidents	No	No
Data collection	Compulsory report by the employer	A special form to be filled in by the staff	Certificate of death	Report by the labor inspectors	Questionnaire filled in by the injury victim	Clippings from the newspapers

TABLE 5.3 (1)CONTINUED

Country	**Greece**			**Netherlands**		
Coding system	ILO (International Labor Office) classification	-	ICD-9	NA	LIS codes	LIS codes
Variables/ injured person	Age, date of birth, gender, profession, place of residence	No. of insurance, name, father's name, gender, date of birth, nationality, address, phone number, profession, occupation	Age, date of birth, gender, religion, nationality, familial situation, profession, educational level, place of residence	Age, gender, nationality, occupation	Age, gender	Age, gender
Role of the injured person in the farm	Worker	Worker	-	Type of contract of employee (including code "other" for bystander/ visitor/ resident of farm area)	Modules (HLA, occupational injuries, transport injuries, sports injuries, violence, self-mutilation)	Modules (HLA, occupational injuries, transport injuries, sports injuries, violence, self-mutilation)
Injury event	Date and hour of the accident, external cause, accident's description, place of the accident	date/time/place of accident, if there was a road traffic accident or not, the mechanism of the accident, products involved	Date and hour of the accident, external cause, accident description, place of the accident.	Date, time, geographical location, place of injury, products involved, activity, injury mechanism	Region of the country where accident happened, place of injury, activity, injury mechanism, date/time of the accident, products involved	Place of injury, activity, injury mechanism, date/ time of the accident, products involved
Diagnosis	Description of the injury, severity	Type of injury, injured body part	-	Type of injury, injured body part	Type of injury (max. 3 injuries), injured body part (max. 3)	Type of injury (max. 3 injuries), injured body part (max. 3)
Treatment	-	Where was the first help accorded, if the patient was transferred for medical care to the hospital (after first help), the way of transportation to the hospital	-		Date/time of attendance, hospital of attendance, treatment (conservative, operative, reanimation), duration of hospitalization, follow up	Date/ time of attendance, hospital of attendance, treatment (conservative, operative, reanimation) duration of hospitalization, follow up
Other variables	-	-	-	-	-	-
Data availability	No	Yes (in special circumstances)	Yes	NA	No	No

Table 5.4: Summary results of the questionnaire regarding the farm injury data sources in **Netherlands and Sweden**

Country	**Netherlands**	**Sweden**		**Portugal**
Data source	**Dutch Injury Surveillance System (LIS)**	**The Swedish Occupational Injury Information System (ISA)**	**European Home and Leisure Accident Surveillance System (EHLASS-current IDB)**	**Accedentes Domesticos e de Lazer: Informacao Adequada (EHLASS_current IDB)**
Responsible Organization	Consumer Safety Institute, Amsterdam	National Board of Occupational Safety and Health	EHLASS	National Health Observatory of the National Health Institute Dr. Ricardo Jorge, Lisbon
Type of farm injuries	Occupational/ Non-work related fatal/ non-fatal: • HLA • Sports injuries • Traffic injuries • Violence • Self-mutilation	Occupational injuries: • non-fatal • fatal	Non-work related farm injuries: • fatal • non-fatal	Non-work related farm injuries: • fatal • non-fatal
Setting	EDs in LIS hospitals	Workplace (individual based register based on employer's reporting)	ED's in 3 hospitals and 1 out-patient clinic	ED's in 12 hospitals and 8 health centers
Population	Injured patients who attend EDs of a LIS hospital		Injured patients who attend EDs of hospitals covered by EHLASS	All ages, 5 regions of Portugal
Coverage	15 LIS hospitals	National	3 hospitals and 1 out-patient clinic	National. Sample ratio: 2.75%
Validity and reliability	Good	Good	Good	Good. Computer framework with very strict validation rules.
Representativeness	Yes (representative sample of the general and teaching hospitals in Netherlands)	Yes (for occupational injury data)	No	Yes. All the 5 regions of Portugal are represented
Data collection	Emergency form filled in by the receptionist of the hospital administration	Injury Report Form	• Standard EHLASS record	Face to face interviews

TABLE 5.4 (1) CONTINUED

Country	**Netherlands**	**Sweden**		**Portugal**
Coding system	LIS codes	ISA codes	EHLASS, NOMESCO	EHLASS
Variables/ injured person	Age, gender, zip code of area of residence	Name, identification no, address, phone, unemployment fund , occupation , no of years in occupation, the professional situation of the injured (i.e. employee, self-employed) , if immigrant	Age, gender	Age, gender
Role of the injured person in the farm	Modules (HLA, occupational injuries, transport injuries, sports injuries, violence, self-mutilation)	Worker	-	-
Injury event	Place of injury, activity, injury mechanism, date/ time of the accident, products involved	Time/ place of accident, activity, main event, previous events and main external agency are described both with a code and with a more detailed free-text, object involved	Place of injury, activity, injury mechanism, date/ time of the accident, products involved	Date and place of occurrence, injury mechanism
Diagnosis	Type of injury (max. 3 injuries), injured body part (max. 3)	Injured parts of the body, nature of injury, injury severity	Type of injury, injured body part	Type of injury, injured body part, date of attendance
Treatment	Date/ time of attendance, ambulance, treatment (conservative, operative, reanimation), length of stay, follow up	-	Type of treatment, follow up, length of hospitalization	follow-up, number of days hospitalized
Other variables	-	-		-
Data availability	No	NA	NA	Yes, after formal request

FARM INJURIES IN PARTICIPATING EU COUNTRIES

SYNOPTIC FINDINGS OF *AGRICULTURE* IN EACH PARTICIPATING EU COUNTRY
RESULTS OF *EXPLOITATION OF FORMER EHLASS DATABASE* (CURRENT IDB) ON FARM INJURIES

AUSTRIA

1. POSITION OF AGRICULTURE

Farmer workers account for a sizeable proportion of the labor force in Austria (9%). Through upstream and downstream sectors (inputs, processing sector), agriculture is closely linked to inter-sectoral division of labor. Approximately 302,000 persons work in this sector. Out of them, about 80,200 (37%) are run as full-time holdings and 129,500 (59%) as part-time holdings. Only 7,800 of holdings (4%) are owned by legal entities. Together with those active in agriculture and forestry, 447,500 persons work in the agriculture and food sector. Including family members, farmers account for almost 25 % of all persons in Austria insured against occupational injuries (excluding pupils and students).

Farms, however, are not only a place of occurrence of occupational injuries but – as in any home – also of home and leisure accidents. The latter do not only affect the farm denizens but increasingly also guests, tourists, neighbor kids and "other users" of the farm premises and land. According to the 1999 Farm Structure Survey (full survey) 217,508 farms were managed in Austria. Agriculture and forestry are still small-structured despite growing

structural change. About 90,000 holdings (41%) manage less than 10 ha cultivated area (Utilized Agricultural Areas and forests). More than 85,000 holdings (39%) are classified as situated in handicap zones.

The Utilized Agricultural Area (UAA) has a share of approximately 41% in the Austrian territory, forests make up about 46%, other areas (waters, building sites, traffic and railway areas) account for about 13%. Related to the federal territory, Austria has the highest share of mountainous areas in the EU (70%). Fifty-two percent of the holdings and 57% of the utilized agricultural area (UAA) are situated in mountainous areas. If we look at less-favored areas as a whole (mountainous areas, other less-favored areas, small-scale structured areas) 70% of the holdings and 69% of the utilized agricultural area are situated in such areas. The total utilized agricultural area comprises 3,4 million ha, of which the share of arable land is about 41%, of intensive grassland (meadows mown several times and seeded grassland) 27%, of extensive grassland (meadows mown once, rough pastures, Alpine pastures, and mountain meadows) 30% and of other types of agricultural land-use (vineyards, orchards, and house gardens, vine and [forest] tree nurseries) 2%. In Austria, about 2,1 million head of cattle were kept in 2001, of which 834,000 were cows. Austria had a pig population of 3,3 million head, 304,000 head of sheep, and 58,000 head of goats.

(Source: Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (2003): Grüner Bericht 2002)

2. FARM INJURIES AMONG CHILDREN (0-14 YEARS OLD) IN AUSTRIA

During a six-year period (1996-2001), a total number of 199 farm injuries among children were recorded in the **Austrian EHLASS database** (current IDB). There was a slight prevalence of *males* (55%), and an increase in the frequency of farm injuries among all children with *increasing age* was noticed (0-4: 8.5%; 5-9: 38.2%; 10-14: 53.3%). The majority of injuries occurred during warm months and *daytime* (especially 16.00-19.59-60.8%). The predominant mechanism of injury was *fall (49.3%),* followed by *cutting/ piercing/ crushing (13.6%).* Concerning the total contribution of objects involved in the injury event, data showed that *manual working tools/ mechanical tools/ machinery* and *animals* were involved in 14.3% and 11.6% of farm injuries among children in Austria, respectively. They affected *mainly upper (55.8%*) and *lower limbs* (33.2%). The most frequent type of injury was fractures, approximately one out of two, followed by contusions/ abrasions (16.6%) and muscle/ tendon/ vessel injuries (14.1%). About one out of five injured children required hospitalization (22.2%).

When comparing **farm injuries with all other HLA children injuries** for the same time period it was concluded that:

1. It is noticeable that the proportion of injured children was higher in "farm injuries" (approx. 25%: 200 from 800) than in other places of occurrence (17%: approx. 10,000 from 60,000)
2. Home and leisure accidents of children on farms (53% admitted) tended to affect more *females* (45%) than accidents occurring in other places of occurrence (40% males)

3. Home and leisure accidents of children on farms tended to affect less victims in the *age group 0-4* and more victims in the *age group 5-9* as compared to accidents occurring in other places of occurrence
4. Home and leisure accidents of children on farms happened more often from *May to July* than accidents occurring in other places of occurrence
5. Home and leisure accidents of children on farms occurred more often by *fall from height* and jammed/pinched than accidents occurring in other places of occurrence
6. Non-fatal child injuries on farms were significantly more often related *to horses and other animals,* farm specific vehicles like *tractors* and the *built environment* on the farm premises (codes 75nnn, 34nnn) than non-farm child injuries
7. Home and leisure accidents of children on farms tended to result more often in *fractures* than accidents occurring in other places of occurrence
8. There were *not any significant differences concerning the injured body part* between home and leisure accidents of children on farms and in other places of occurrence

3. FARM INJURIES AMONG ADULTS IN AUSTRIA

During the six- year period (1996-2001), 600 farm injuries among adults (15+ years old) were recorded in the Austrian EHLASS database (current IDB). The majority of injuries involved *males* (57.3 %) and about *one out of five cases concerned elderly people over 65 years old.* Most farm injuries occurred during *warm months* and *daytime* (8:00-19:59). *Falls* was the predominant mechanism of injury (49.7%), followed by *collisions* (25.5%), mainly with *animals and cutting/ piercing/ crushing* (9.7%). Concerning the total contribution of

objects involved in the injury event, data showed that *manual working tools/ mechanical tools/ machinery and animals* were involved in 12.0 and 21.4% of cases, respectively. They affected *mainly upper (32.8%)* and *lower limbs* (46.7%) and one out of two injuries led to a fracture. The hospitalization rate was significantly high, reaching 52.5%.

When comparing **farm HLA injuries with all other HLA injuries among adults** for the same time period it was concluded that:

1. Home and leisure accidents of adults on farms (53% admitted) tended to affect more *males* (57%) than accidents occurring in other places of occurrence (51% males).
2. Home and leisure accidents of adults on farms tended to affect less victims in the age group 15-24 and *more victims in the age group 45-64* as compared to accidents occurring in other places of occurrence.
3. Home and leisure accidents of adults on farms happened more often from *May to July* than accidents occurring in other places of occurrence.
4. Home and leisure accidents of adults on farms took place more often in the *late afternoon* than accidents occurring in other places of occurrence.
5. Home and leisure accidents of adults on farms occurred more often *by fall and collision* than accidents occurring in other places of occurrence.
6. No striking differences in injured body part were found between home and leisure accidents of adults on farms and in other places of occurrence.
7. Home and leisure accidents of adults on farms tended to result more often in fractures than accidents occurring in other places of occurrence.
8. Home and leisure accidents of adults on farms (53% admitted) tended to be *more seve*re than accidents occurring in other places of occurrence (35% admitted).

4. OCCUPATIONAL FARM INJURIES IN AUSTRIA

Occupational farm injuries in Austria are recorded by the Farmers' Social Health and Accident Insurance (data provided for the year 2000). Respective injury data cover self-employed persons working in the farming and forestry sector and the family members helping with the work. In 2001, 6,374 occupational farm injuries were registered, 78 of which were fatalities. Five percent of non-fatal, but 33% of all fatal injuries of all occupational injuries affect farmers (Figure 1, Occupational injuries by Insurance Category and Share of Fatalities).

Figure 1

Insurance category	**All occupational injuries**		**Fatal occupational injuries**	
Farmers (SVB)	6.374	5%	78	33%
Other Categories	112.777	95%	156	67%
All Categories	119.151	100%	234	100%

Compared to other sectors, in occupational farm injuries women were affected above average- 30% (Figure 2, Occupational Injuries by Insurance Category and Sex).

Figure 2

	Occupational injuries	
Insurance category	*Male*	*Female*
Farmers (SVB)	70%	30%
Other Categories	77%	23%
All Categories	77%	23%

Compared to other sectors, falls, animals and falling objects were the main causes of occupational farm injuries (Figure 3, Occupational injuries by Insurance Category and Main Causes).

Figure 3

Main Causes	Farmers (SVB)	Other Categories
Falls	40%	27%
Animals	15%	1%
Falling Objects	24%	6%

5. CONCLUSIONS

The most important findings of the analysis of the available data about occupational and non-occupational farm injuries in Austria showed that farmers and their families had a highly increased risk of injury fatalities and that injuries related to farm specific activities tended to be more severe than those related to other activities.

In occupational injuries only 5% of non-fatal but 33% of all fatal injuries affected farmers – farmers account for 9% of the labor force in Austria (as recorded by the Farmers' Social Health and Accident Insurance, SVB).

Similar results were obtained from a study of child injuries among farmers' families. The risk for a non-fatal injury in farmers' children was even less than in other children (below the age of 15) but the risk for fatal injuries was threefold increased as compared to other children (Furian, et al, 2002). Farm specific vehicles like tractors were identified as the mayor source

for injury fatalities, especially among toddlers. In general, only a small proportion (less than 10%) of child injuries on farms was related to farm specific activities. This study is not further dealt with in this report.

Non-fatal child injuries on farms were significantly more often related to horses and other animals, farm specific vehicles like tractors and the built environment on the farm premises than non-farm child injuries. It was noticeable that the share of child accident was higher in "farm injuries" (25%) than in other places of occurrence (17%). Differences between farm injuries and non-farm injuries that might be relevant for injury prevention were also found in sex and age of victims, mechanism, main object involved in injury event, month and time of day of the accidents (EHLASS Austria 2001).

In non-occupational injuries of adults (of farmers, family members, guests, tourists and "users" over 14 years of age) animals (mainly horses), "pits, ditches, holes", ladders and farm specific vehicles like tractors were identified as being more frequently involved as objects related to injury events on the specific farm "location" than in other places of occurrence of home and leisure accidents.

FRANCE

1. POSITION OF AGRICULTURE

The total **agricultural area** of France is around **33 million hectares, about 60% of the country**. This agricultural area has been slowly decreasing for many years. About 3 million hectares of this land is uncultivated, so the Utilized Agricultural Area (UAA) is therefore about 30 million hectares, that is 0.5 hectare per head of population, and **about 23% of the total agricultural area of the 15 EU States**.

The greater part utilized agricultural area (around 60%) is arable land: the area still under grass is a little less than 35% of the total; vineyards and orchards now account for only about 4% of it, following moves to concentrate fruit-growing in specialized farms and the grubbing-up of some of the vineyards producing ordinary wine. The areas planted to cereals (around 9 million hectares) and sugar beet (about 450,000 hectares) have been fairly stable for 40 years. The areas under oil seeds and protein crops have greatly increased, up from 250,000 hectares in 1960 to over 2.7 million today. The total area under arable crops has increased by more than 2.3 million hectares. By contrast, the area devoted to animal feed (areas still under grass and fodder crops) has been reduced, falling in 40 years from 20 to 14.6 million hectares and accounting both for most of the decline in the total agricultural area and the expansion of arable crops.

The number of farms has been in constant decline, at a rate fluctuating between 3% and over 5% per year. In 1997 there were about **680,000** agricultural holdings (compared with 1.6 million in 1970), 424,000 of them farmed full time. The average farm's size is close to **42**

hectares that is more than twice the average for the fifteen EU countries. About 70,000 farms, 11% of the total, are larger than 100 hectares and account for 43% of the total area, whereas 244,000 farms of under 10 hectares (many of them part time) account for only 3%.

Employment on these holdings is directly related to their size, and more specifically to the area available per worker. The bulk of French holdings used to be devoted to mixed cropping and stock farming, but the number of these has gradually declined, giving way to more specialized farms. While the largest can employ and pay their workforce by devoting themselves almost exclusively to arable crops, most medium-sized farms still concentrate on stock farming, particularly dairy farming and the intensive production of beef meat in fattening plants. The smallest farms specialize in products with a high gross yield per hectare: viticulture, market gardening, specialized animal production (pork or poultry).

The number of people employed in agriculture has declined faster with that of holdings. Fewer family members, other than the farmer and his wife, about 24,000 in 1997 working in farms. There has also been a sharp decline in the number of permanent farm workers. In 1997, agricultural holdings provided employment for **1,260,000 family members**, 473,00 of them full time, and **140,000 permanent farm workers**. This workforce accounts for about 4% of the total working population (compared with 8% twenty years ago), a level very close to the European average.

Source: www.agriculture.gouv.fr

2. FARM INJURIES AMONG CHILDREN (0-14 YEARS OLD) IN FRANCE

During a five-year period (1996-2000) 162 farm injuries among children were recorded in the French EHLASS database (current IDB). The majority of injuries involved *boys* (68%), whereas a substantial increase in the frequency of farm injuries among all children with *increasing ag*e was noticed (0-4: 15.4%; 5-9: 24.6%; 10-14: 50.0%). The majority of injuries occurred during *warm months and daytime* (8.00-19.59). The predominant mechanism of injury is *fall* (44.4%), following by *cutting/ piercing/ crushing* (12.3%). Concerning the total contribution of objects involved in the injury event, data showed that manual working tools/ mechanical tools/ machinery and animals were involved in one out of eight farm injuries among children in France, respectively. They affected mainly upper (31.5%) and lower limbs (40.1%) and one out of six injuries led to a fracture. The hospitalization rate reached 17.3%.

When comparing farm HLA injuries when with all other HLA children injuries for the same time period we concluded that:

1. More *male* children sustained an injury in farms (68.8% vs. 58.6%)
2. In farms, *less fall- related injuries occurred* (44.4% vs. 54.2%); however, more cases involving *cutting/ piercing/ crushing* (12.3% vs. 5.8%) and *bite by animal* (9.3% vs. <1%)
3. More fractures were recorded in farm injuries (17.9% vs. 12.5%)
4. The injured body part distribution was very different; lower limbs were more frequently affected (40.1% vs. 20.1%) and head and face area was less frequently affected (21.0% vs 33.7%)
5. The hospitalization rate in child farm injuries was *2- fold higher* (17.3% vs. 8.5%)

3. FARM INJURIES AMONG ADULTS IN FRANCE

In a five-year period (1996-2000) 352 farm injuries among adults (15+ years old) were recorded in the French EHLASS database (current IDB). The majority of injuries involved *males* (68.2 %) and about one out of four cases concerned young people under 25 years old. The majority of injuries occurred during *warm months* and *daytime* (8.00-19.59). The predominant mechanism of injury is *fall* (41.8%), following by *cutting/ piercing/ crushing* (11.3%). Concerning the total contribution of objects involved in the injury event, data showed that manual working tools/ mechanical tools/ machinery and animals were involved in 10.9 and 23.9% of cases, respectively. They affected mainly upper (34.9%) and lower *limbs* (40.6%) and one out of four injuries led to a fracture. The hospitalization rate reached 19.9%.

When comparing farm HLA adult injuries with all other HLA injuries among the same target group for the respective period we concluded that:

1. More *male* adults sustained an injury in farms (68.2% vs. 58.0%)
2. In farms, *less fall- related injuries occurred* (41.8% vs. 46.0%); however, more cases involving *cutting/ piercing/ crushing* (11.3% vs. 3.3%) and *bite by animal* (10.5% vs. <1%)
3. More fractures were recorded in farm injuries (22.5% vs. 17.3%)
4. The injured body part distribution was different; lower limbs were more frequently affected (40.6% vs. 33.2%) and head and face area was less frequently affected (8.0% vs. 15.9%)
5. The hospitalization rate in child farm injuries was *1.5- fold higher* (19.9% vs. 12.5%)

DENMARK

1. POSITION OF AGRICULTURE

Denmark is situated in the northern part of EU and is one of the Nordic and Scandinavian countries. It is a relatively small country with a population of 5.3 million inhabitants, and the GNP per capita is approximately 35,000 USD.

In 2000, primary agriculture, including for farming and horticulture, employed 84,000 people, about 3% of the workforce. Although the contribution of agriculture in the Danish economy has steadily fallen in step with industrialization and economic developments as a whole, farming still remains an essential occupation based on its net foreign currency earning capacity, its effect on employment and its importance in supplying everyday foodstuffs. A further 100,000 persons are employed in industries downstream from primary production, most notably the food processing companies.

Denmark is a flat country with rich agricultural land situated in a temperate climate. Summers are generally warm with an average temperature of 16.4 degrees centigrade and freezing temperatures are seldom experienced in winter for prolonged periods. About 2.7 million hectares or 63% of Denmark's land area is cultivated farmland. Grain crops amount to over 50% of Denmark's agricultural production with wheat, barley and rye being the most widespread. Roughage - beets and grass - are also grown. Two thirds of production is utilized as fodder for animals.

About 23 million pigs are produced in Denmark each year, three-quarters of these for export, which constitutes 7% of Denmark's total annual export. From the beginning of the 1980s the production of pigs has risen by almost 50%, whereas at the same period milk production fell by 15%.

In the 1930s, about 3,2 million hectares were under cultivation. Due to urban development and recreational activities, especially since 1960, the area devoted to agriculture was significantly reduced. Meanwhile, profound changes have occurred the structure of farms. In 1950s there were about 200,000 farms with an average area of 16 hectares, but in the second half of the 20th century they began to decline slowly, so that in 1999 the number of holdings had fallen to 58,000 with an average area of 46 hectares. Changes during the last decade were mainly due to EU regulations (cutting down the agriculture), which had an essential impact on the agricultural sector. Self-ownership is a sustaining element of farming in Denmark. There are only few corporation-owned units and co-operatively owned farming units.

Source: http://www.organic-europe.net/country_reports/denmark/default.asp

2. FARM INJURIES AMONG CHILDREN (0-14 YEARS OLD) IN DENMARK

During a five-year period (1998-2002) 113 farm injuries among children were recorded in the Danish EHLASS database (current IDB). There was a slight prevalence of *males* (male: female ratio =1,1), and the frequency of the recorded injuries was increased *with increasing age* (0-4: 10.6%; 5-9: 25.7%; 10-14: 63.7%). The majority of injuries occurred during *warm*

months (only one out of ten injuries during winter) and *daytime* (8:00-19:59). The predominant mechanism of injury was *fall* (35.4%), mainly from height or stairs, followed by *collision* (29.2%, of which one out of two with animal) and *cutting/ piercing/ crushing* (24.8%). Concerning the total contribution of objects involved in the injury event, data showed that *manual working tools/ mechanical tools/ machinery and animals* were involved in one out of five farm injuries among children in Denmark, respectively. The injuries affected mainly upper (38.1%) and lower limbs (38.9%). Most of them were contusions/ abrasion and open wounds (about two thirds) but there were also noticed significant percentages of more severe injuries, as fractures (18.6%) and dislocations/ distortions (16.8%). About one out of ten children required hospitalization.

3. FARM INJURIES DURING HOME AND LEISURE ACTIVITIES AMONG ADULTS IN DENMARK

During a five-year period (1998-2002) 295 farm injuries among adults (15+ years old) during home and leisure activities were recorded in the Danish EHLASS database (current IDB). Most of them occurred among *males* (male: female ratio = 1.27) and about one out of four cases concerned *young people under 25 years o*ld. Half of the injuries took place during *warm mont*hs and about one out five in wintertime. The majority of injuries occurred during *daytime* (8.00-19.59). The predominant mechanism of injury is *collision* (40%), mainly with *animals* (6 out of ten), *fall* (27.5%), followed by *cutting/ piercing/ crushing* (14.2%) and *overexertion* (10.1%). Concerning the total contribution of objects involved in the injury event, data showed that *animals* (mainly horses) and *manual working tools/ mechanical*

tools/ machinery were involved in 32.8 and 17.5% of cases, respectively. Upper (39.6%) and lower limbs (40%) were the most frequently injured body parts; about one out of 8 affected head and face area. Injuries of considerable severity (fractures, dislocations, distortions) were recorded in about 40% of the cases. The majority of victims required treatment and follow up, whereas the hospitalization rate was 6.8%.

4. OCCUPATIONAL FARM INJURIES AMONG ADULTS IN DENMARK

For the purpose of this project, Danish partnership provided also occupational farm data (recorded in the Danish Injury Register, NIPH) in order to further examine this kind of injuries in the occupational sector too. For the same study time-period (1998-2002), 1511 occupational farm injuries were recorded, most of them (85%) among *males*. About one out of four injuries sustained by *young persons* (15-24 years old) and the frequency was *decreased with increasing age*. Injuries were almost equally distributed among the four seasons and occurred mainly during daytime, but it is of interest that about one out of five took place between *20.00 and 7.59*. The main mechanisms of injury were *collision* (35.2%, half of which with animals), *cutting/ piercing/ crushing* (29.1%), fall (13.6%), overexertion (8.7%) and foreign body (8.5%). In terms of the total contribution of objects involved in the injury event, data showed that manual working tools/ mechanical tools/ machinery and animals were involved in 29.3 and 26.7% of cases, respectively.

About 40% of injuries were of significant severity (e.g. fractures, distortions, burns, poisoning, amputations, muscle/tendon/vessel injuries). Injuries mostly affected upper limbs (44.6%) and lower limbs (29.5%), whereas one out of five occupational farm injuries

affected the head and face area. About four out of ten injured persons required treatment and follow up and the hospitalization rate was 7%.

When **comparing occupational farm injuries among adults with home and leisure accidents** (HLA) among the same target group for the same time period, we concluded that:

1. More male adults sustained occupational farm injuries (85% vs. 55.9%)
2. More elderly people (65+) sustained HLA farm injuries (12.5% vs. 5.4%)
3. More HLA farm injuries occurred during weekend time (35.2% vs. 17.1%)
4. Among the studied injury mechanisms, cutting/ piercing/ crushing (29.1% vs. 14.2%), foreign body (8.5% vs. 2.7%) and burns (2.3% vs. 0.7%) were more frequently involved in occupational farm injuries.
5. Collisions with animals (23% vs. 16.9%), animal bites (3% vs. 1.9%) and falls (27.5% vs. 13.6%) were more frequently the injury mechanisms in HLA farm injuries.
6. The injured body part distribution was different; lower limbs were more frequently affected (40% vs. 29.5%) in HLA farm injuries, whereas head and face area is more frequently affected (20.1% vs. 12.9%) in occupational ones.

GREECE

1. POSITION OF AGRICULTURE

In 1995, there were about 774,000 farms in Greece, whereas the total agricultural area was around 5,148,000 hectares. The average farm size is about 6.6 hectares. With about 15% of the labor force involved in agriculture sector, Greece has the highest proportion of farming population among the European Union Member States (OECD, 2001). In Greece, a country with mild climate, the nature of agriculture is similar to that of other southern European countries. The main agricultural products are wheat, citrus fruit, cotton, olive oil, and tobacco. The animal capital includes mainly sheep, goats, cattle, pigs, and beehives, while the animal production is concentrated on dairy products, meat, and honey (NSSG, 2000)

Water is the main determining factor with respect to crops and yields. Rain-fed crops involve a higher cultivation risk and lower income. Therefore, only a small range of crops is cultivated on fields that cannot be irrigated (cereals, pulses, some fodder crops, sesame, olives, wine). Crop and animal production in Greece are traditionally separate from each other. Animals, mostly sheep and goats, graze on harvested fields and public land, including woodland, grassland and barren land. In the winter, grazing is supplemented by animal feed produced by the same farmer or purchased in the region around the farm. There are, however, big animal farms similar to those in western and central Europe producing eggs, milk and meat for the centers of consumption exclusively from purchased animal feed.

Sources:

http://www.organic-europe.net/country_reports/greece/default.asp

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2. FARM INJURIES AMONG CHILDREN (0-14 YEARS OLD) IN GREECE

During a five-year period (1996-2000), 277 farm injuries among children were recorded in EDISS (Emergency Department Injury Surveillance System), which has been developed and run by CEREPRI at the University of Athens Medical School. There was an evident prevalence of *males* (72.6%), and *children 5-9 years* old seemed to be more vulnerable (48%). The predominant mechanism of injury is *fall* (46%), followed by *cutting/ piercing/ crushing* (15.5%), *collision* (15.3%, of which one out of eight with animal) and transport (non-traffic injury involving off-road vehicle) 8.5%. Concerning the total contribution of objects involved in the injury event, data showed that m*anual working tools/ mechanical tools/ machinery and animals* were involved in 7.4% and 6.9% of the cases, respectively. The injuries were affected mainly upper (36.8%) and lower limbs (28.9%). It is worth noting that one out of five children were injured in head and face area. Most of them led to contusions and *open wounds*, however, about one out of three led to serious injuries, e.g. fractures (21%) and concussions (5.4%, which is the highest percentage among the participating countries. About one out of two injured children required treatment and follow up, whereas the hospitalization rate was relatively high (17.7%).

3. FARM INJURIES DURING HOME AND LEISURE ACTIVITIES AMONG ADULTS IN GREECE

During a five-year period (1996-2000) 1684 farm injuries among adults (15+ years old) during home and leisure activities were recorded in EDISS. Two thirds of the recorded injuries affected *males*. In contrast with other countries, *elderly people* (65+) sustained a significant percentage of unintentional farm injuries (32.7%). Less than half of the injuries took place during *warm months* and about one out five in wintertime. Over 90% of injuries occurred during daytime (8.00-19.59) and on an equal time basis, they were equally distributed into the three consisting time groups (8.00-11.59: 29.8%, 12.00-15.59: 32.7%, 16.00-19.59: 30.2%). The dominant mechanism of injury was falls (57.1%), followed by *cutting/ piercing/ crushing* (14.7%) *collision* (12.7%), animal bite (5.6%) and *overexertion* (4.7%). In terms of the total contribution of objects involved in the injury event, data showed that *manual working tools/ mechanical tools/ machinery and animals* were involved in 11.9 and 7.8% of cases, respectively. Upper (36.8%) and lower limbs (33.9%) were the most frequently injured body parts; about one out of 8 affected head and face area. Injuries of significant severity (fractures, dislocations, distortions, concussions) were recorded in about 40% of the cases. The majority of victims required treatment and follow up (about 80%), whereas one out of seven required hospitalization.

4. OCCUPATIONAL FARM INJURIES AMONG ADULTS IN GREECE

For the purpose of this project, Greek partners also provided occupational farm data. During 1996-2000, 2,365 occupational farm injuries were recorded, most of them (69.5%) among *males.* The frequency of occupational farm injuries was *increased with increasing age* and, about one out of four referred to elderly people (65+). The majority of injuries took place during *daytime*, which is in line with the fact that in Greece the working day rarely extends beyond 18.00. Injuries were almost equally distributed among the four seasons. The main mechanisms of injury were *falls* (53.1%), followed by *cutting/ piercing/ crushing* (19.3%), collision (12.9%), overexertion (4.4%) and foreign body (2.4%). About 30% of injuries were of significant severity (i.e. fractures, distortions, concussions, poisoning). Injuries were mostly affected upper limbs (36.5%), lower limbs (31.8%), whereas about one out of six occupational farm injuries affected the head and face area.

Trunk injuries during occupational farm activities were more frequently recorded in Greece (16%), in comparison with Denmark (5.8%) and the Netherlands (8.1%). About four out of two injured persons required treatment and follow up and the hospitalization rate was 15%.

When comparing **occupational farm injuries among adults with home and leisure ones** among the same target group for the same time period we concluded that:

1. The male: female ratio was the same (about 2.3: 1)
2. Occupational farm injuries were more frequently occurred in 15-24, 25-34, 35-44 and 45-54 age groups, whereas HLA ones more frequently in 55-64 and 65+ age groups.

3. Leisure farm injuries were disproportionally concentrated over the weekends (34.4% vs. 26.8%).
4. Among the studied injury mechanisms, cutting/ piercing/ crushing (19.3% vs. 14.7%), non- traffic injury involving off- road vehicle (2.9% vs. 2%) and foreign body (2.4% vs. 1.5%) were more frequently involved in occupational farm injuries.
5. Falls from height (26.4% vs. 21.3%), animal bites (5.6% vs. 4.2%) and overexertion (27.5% vs. 13.6%) were more frequently the injury mechanisms in HLA farm injuries.
6. The injured body part distribution is different; lower limbs are more frequently affected (40% vs. 29.5%) in HLA farm injuries, whereas head and face area is more frequently affected (20.1% vs. 12.9%) in occupational ones.

5. CONCLUSIONS

Farm injuries represent an under- appreciated public health problem, the magnitude of which increases with the prevalence of farming in a particular population. These injuries are frequently serious and occasionally occur in settings far from healthcare outlets. They have distinct characteristics that make some of them amenable to simple preventive measures. In Greece, farm injuries are frequently serious and require hospitalization. These injuries show distinct patterns among young individuals (non- traffic vehicle related injuries) and among older women (lower limb fractures). Prevention strategies should give priority to these population groups. These prevention strategies should include guidance for poorly educated workers, enforcement of safety regulations concerning farming machinery, and discouragement of risky farming activities among elderly individuals.

THE NETHERLANDS

1. POSITION OF AGRICULTURE

The Netherlands, with a population of 16 million in the year 2001 and a surface area of about 4,15 million hectares, is one of the most densely populated countries in the world. The agricultural area amounts to two million hectares, and in 1999 there were around 100,000 farms. About 4% of the labor force is involved in agriculture sector. Farming concentrates on cattle (56%), horticulture (21%) and arable cropping (14%). Fruit-growing farms account for almost 5% percent of the farms and mixed farms for another 4%.

Source: http://www.organic-europe.net/country_reports/netherlands/default.asp

2. FARM INJURIES AMONG CHILDREN (0-14 YEARS OLD) IN THE NETHERLANDS

The Dutch Injury Surveillance System (LIS) records statistics concerning people treated at Emergency Departments of about fifteen hospitals in the Netherlands. These hospitals form a representative sample of the general and university hospitals in the country; this enables extrapolation of the registered numbers to national figures, provided that the numbers are large enough. The following figures that are mentioned for the Netherlands are extrapolated. During a four-year period (1997-2000) it was estimated that about 430 farm injuries occurred among children in the Netherlands. Injuries were almost equally distributed to the two genders and their frequency was *increased with increasing age* (0-4: 21%; 5-9: 35%; 10-14:

44%). The majority of injuries occurred during *warm months* and about one out of five during wintertime. Most of them took place during *daytime* (8.00-19.59) but one out of seven between 200.00-7.59. *Falls*, especially *from height or stairs* represented the main injury mechanism (50%), followed by *cutting/ piercing/ crushing* (21%), *collision* (18%, of which one out of two with animal) and non- traffic injury involving off- road vehicle (6%). Concerning the total contribution of objects involved in the injury event, data showed that manual *working tools/ mechanical tools/ machinery and animals* were involved in about 13% and 17% of the injured children in farms. Injuries were affected mainly upper (51%) and lower limbs (31%), whereas one out of seven the head and face area. About half of them were of significant severity (fractures- 36%, dislocations- 6%, crushing/ amputations- 2%, concussions- 2%). One out of eight children were injured seriously enough to require hospitalization.

3. FARM INJURIES DURING HOME AND LEISURE ACTIVITIES AMONG ADULTS IN THE NETHERLANDS

For the respective period (1997-2000), it was estimated that about 610 farm injuries among adults (15+ years old) took place during home and leisure activities in the Netherlands. Most of them involved *males* (male: female ratio = 1.32). One out of four injuries concerned *young people less than 25 years old*, whereas among the victims one out seven was elderly (65+). Most of the injuries happened during *daytime,* however, it is worth noting that 20% of them occurred between 20.00-7.59. One out of three cases took place during *summer.* The predominant mechanism of injury was *falls* (42%), followed by *collision* (33%, of which two thirds with *animal*), *cutting/ piercing/ crushing* (17%). In terms of the total contribution of objects involved in the injury event, data showed that *animals (mainly horses) and manual*

working tools/ mechanical tools/ machinery were involved in 35 and 8% of cases, respectively. Upper (43%) and lower limbs (37%) were the most frequently injured body parts; about one out of 8 affected head and face area. No minor injuries (fractures, dislocations, crushing/ amputations) were sustained by 40% of the cases. The majority of victims required treatment, whereas the hospitalization rate was 9%.

4. OCCUPATIONAL FARM INJURIES AMONG ADULTS IN THE NETHERLANDS

The Netherlands provided also occupational farm data for the purpose of this project. During 1997-2000, it was estimated that about 1500 occupational farm injuries took place in the Netherlands, most of them (89%) among males. One out of four injuries sustained by adults aged *25-34 years* old, whereas one out of ten affected elderly people 65+. Injuries were almost equally distributed *among the four seasons* and occurred mainly during *daytime*, but it is worth noting that about one out of five took place between 20.00 and 7.59. The main mechanisms of injury were *collision* (40%, half of which with *animals*), *cutting/ piercing/ crushing* (26%) and *fall* (26%). In terms of the total contribution of objects involved in the injury event, data showed that *animals and manual working tools/ mechanical tools/ machinery* were involved in 25% and 20% of cases, respectively. About 50% of injuries were of minor severity (contusions, open wounds) and about 4 out of ten more severe i.e. fractures, distortions, muscle/tendon/vessel injuries. Injuries were mostly affected upper limbs (51%), lower limbs (31%), whereas in one out of ten cases the head and face area constituted the injured body part.

The majority of injured farmers required treatment (88%) and the hospitalization rate was 11%.

When compared to occupational farm injuries among adults with home and leisure ones among the same target group for the same time period, we concluded that:

1. More male adults sustained occupational farm injuries (89% vs. 57%)
2. More young people (23% vs. 16%) and elderly (15% vs. 10%) suffered HLA farm injuries
3. More HLA farm injuries occurred during weekend time (81% vs. 68%)
4. Among the studied injury mechanisms, cutting/ piercing/ crushing (26% vs. 17%), and foreign body (2% vs. >1%) were more frequently involved in occupational farm injuries.
5. Falls (42% vs. 26%) and animal bites (3% vs. 2%) and were more frequently the injury mechanisms in HLA farm injuries.
6. The injured body part distribution was different; lower limbs were more frequently affected (37% vs. 31%) in HLA farm injuries, whereas upper limbs (51% vs. 43%) were more frequent in occupational farm injuries.

The hospitalization rate was higher in occupational farm injuries (11% vs. 9%).

SWEDEN

1. POSITION OF AGRICULTURE

Sweden is one of the biggest countries in European Union. Its arable land, however, amounts to only 2.8 million hectares (1998), which represent about 7% of the total land area.

Structural development in Sweden in the past few decades has led to intensification and specialization of agriculture and to fewer and larger farms. In 1961 Sweden had 233,000 agricultural holdings, which had decreased to 85,600 by 1998. During 1990-1998, the average farm's size increased from 29 to 33 hectares. The total number of cows, at the same time period, decreased while the average number per farm increased from 22 to 30, and the number of pigs per farm increased from 158 to 315. Since 1994, the total agricultural production has increased; in particular, grain and sugar production increased by approximately 10% percent, legumes production increased by 250%, whereas oilseed production decreased by 60%.

Source: http://www.organic-europe.net/country_reports/sweden/default.asp

2. FARM INJURIES AMONG CHILDREN (0-14 YEARS OLD) IN SWEDEN

During 1998- 2002, 638 farm injuries among children were recorded in the Swedish EHLASS database (IDB). In all participating countries there was a prevalence of males among injured children with the exception of Sweden, where *females* were involved in 55.1%

of the cases. The frequency of injuries was *increased with increasing age* (0-4: 12.9%, 5-9: 34.6%, 10-14: 52.5%). Nine out of ten injuries occurred during *daytime* (8.00-19.59, whereas more than half during 16.00-19.59). As expected most of them took place during *warm months* and in particular one out of three during summertime. The predominant mechanism of injury was *falls* (47.6%), following by *collisions* (22.7%- about half with animals) and *cutting/ piercing/ crushing* (14.6%). Concerning the total contribution of objects involved in the injury event, data showed that animals and manual working tools/ mechanical tools/ machinery were involved in 29.4% (mainly *horses*) and 7.8% of the cases, respectively. About two thirds of injuries affected *limbs;* upper (42.8%) and lower limbs (24.6%) but a significant portion of them were located to *head and face area*, about one out of four cases. About 50% of injured children sustained contusions or open wounds, whereas about one out of three, fractures or dislocations/ distortions. A relatively high percentage of *concussions* were recorded (5%, the second higher among the participating countries), which comes in line with the fact that about one out of four cases the recorded injuries affected head and face area. One out of ten injured children required hospitalization.

3. FARM INJURIES AMONG ADULTS IN SWEDEN

During the same five-year period (1998-2002), 1889 farm injuries sustained by among adults (15+ years old), according to the Swedish EHLASS database (current IDB). They were equally distributed between the two genders. People aged 15-44 sustained about 60% of such injuries, whereas one out of seven referred to elderly persons. The majority of injuries occurred during *daytime* (8.00-19.59) and *warm months*. The main injury mechanisms were

collisions (34.7%), *falls* (28.2%) and *cutting/ piercing/ crushing* (19.1%- higher in comparison with other participating countries), animal bites (5.4%) and foreign bodies (4.7%). In terms of the total contribution of objects involved in the injury event, data showed that *animals and manual working tools/ mechanical tools/ machinery* were involved in 32.7 and 14.8% of cases, respectively. In most of the cases, farm injuries affected *limbs;* upper limbs (39.8%) and lower limbs (32.7%), whereas a high percentage of them were located to the head and face area (17.4%- the second highest percentage among the participating countries). Half of the cases sustained contusion or open wounds, whereas about one out of three ended to injuries of relatively high severity, i.e. fractures or dislocations. The hospitalization rate reached 11.1%.

PORTUGAL

1. POSITION OF AGRICULTURE

Portugal with a surface area of 91,640 square kilometers has a mainland of 9.2 million hectares: 2,705 arable and permanent cropland (including 710 in permanent crops), 530 permanent pastures, 3,640 forests and woodland, and 2,270 other lands.

Among the leading Portuguese grain crops is wheat, followed by corn, which is grown mainly on the small farms of the north and rice. Potatoes and corn silage are mainly found throughout the north. Portugal's leading edible tree crop is olive oil. The country produces a variety of horticultural crops, some of which are exported. As an example, Portugal is among the leading world exporter of tomato paste. In the mid-1980s, over 300,000 hectares were in vineyards, which were located in the northern valleys of the country.

Although pastureland is scarce, livestock constitutes a significant share of total agricultural production. Three-fourths of the mainland's milk is produced in the northwest's coastal areas. The mainland's livestock numbers in 1987 included over 1.3 million head of cattle, over 5 million sheep, nearly 3 million pigs, and 745,000 goats. About 18 million chickens supplied the country's poultry industry that year.

Source: http://countrystudies.us/portugal/68.htm

http://www.nationmaster.com/country/po/Agriculture

2. FARM INJURIES AMONG CHILDREN (0-14 YEARS OLD) IN PORTUGAL

In 2002, 82 farm injuries among children were recorded in the Portuguese EHLASS database (current IDB). There was a prevalence of *male victims* (male: female ratio = 3:1) and children *aged 5-9 years* old were more frequently involved (0-4: 18.3%, 5-9: 42.7%, 10-14: 39%). About two thirds of injuries occurred during *warm months and daytime* (8.00-19.59), but it is of interest that 1 out of 4 such injuries took place between 20.00- 7.59. The predominant mechanism of injury was *falls* (52.4%), following by collisions (23.4%- about half with animals) and cutting/ piercing/ crushing (12.2%). They affected mainly upper (35.4%) and lower limbs (35.4%) but a significant portion of them were located to head and face area. About 75% were of minor severity, whereas a relatively high percentage of concussions were recorded (4.9%). One out of five injured children required hospitalization.

3. FARM INJURIES AMONG ADULTS IN PORTUGAL

For the same period, 2002, 649 farm injuries sustained by among adults (15+ years old), according to the Portuguese EHLASS database, mainly among males (77.8%). It is worth noting that in Portugal a high portion of people with farm injuries were *elderly* (21.9%). The majority of injuries occurred during *warm months and daytime* (8.00-19.59). The main injury mechanisms were *falls* (48.9%), collisions (33.4%) and cutting/ piercing/ crushing (12.6%). In most of the cases, farm injuries affected *limbs*; upper limbs (28.2%) and lower limbs

(30.1%), whereas a high percentage of them were located to the head and face area (28.3%- the highest among the participating countries). In line with the high portion of head and face area related farm injuries a relatively high percentage of such injuries ended to concussions (8.6%), whereas the rest of them were basically of less severity (contusions and open wounds). One out of seven adults required hospitalization.

Table 6. Distribution of children (0-14 years old) injured in farms by gender and age in selected EU countries

Country	Austria (1996-2001)		Denmark (1998-2002)		France (1996-2000)		Greece (1996-2000)		Portugal (2002)		Sweden (1998-2002)		Netherlands (1997-2000)	
Demographic variables	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Gender														
Male	110	55.3	59	52.2	111	68.5	201	72.6	62	75.6	287	44.9	250	59.0
Female	89	44.7	54	47.8	51	31.5	76	27.4	20	24.4	351	55.1	180	41.0
Age (years)														
0-4	17	8.5	12	10.6	25	15.4	29	10.5	15	18.3	82	12.9	90	21.0
5-9	76	38.2	29	25.7	56	34.6	133	48.0	35	42.7	221	34.6	150	35.0
10-14	106	53.3	72	63.7	81	50.0	115	41.5	32	39.0	335	52.5	190	44.0
Event descriptive variables														
Time*														
8.00-11.59	14	7.0	18	15.9	25	15.4	30	10.8	10	12.2	57	10.2	70	17.0
12.00-15.59	48	24.1	36	31.9	46	28.4	83	30.0	24	29.3	180	32.3	120	28.0
16.00-19.59	121	60.8	39	34.5	67	41.4	121	43.7	27	32.9	270	48.4	180	41.0
20.00-7.59	16	8.1	20	17.7	24	14.8	43	15.5	21	25.6	51	9.1	60	14.0
Day														
Weekday	134	67.3	75	66.4	93	57.4	165	59.6	54	65.9	408	64.0	280	66.0
Weekend	65	32.7	38	33.6	69	42.6	112	40.4	28	34.1	230	36.0	140	34.0
Season														
Winter	12	6.0	13	11.5	31	19.1	44	15.9	7	8.5	64	10.0	80	19.0
Spring	70	35.2	26	23.0	37	22.8	83	29.9	25	30.5	175	27.4	140	32.0
Summer	77	38.7	32	28.3	68	42.0	75	27.1	32	39.0	216	33.9	140	32.0
Autumn	40	20.1	42	37.2	26	16.1	75	27.1	18	22.0	183	28.7	70	17.0
Mechanism of injury														
Fall from height, stairs	36	18.1	28	24.8	31	19.1	59	21.4	6	7.3	219	34.3	150	35.0
Fall, same level	31	15.6		8.0	41	25.3	60	21.7	18	22.0	48	7.5	30	7.0
Fall, other	31	15.6	3	2.6	0	0.0	8	2.9	19	23.1	37	5.8	40	8.0
Cutting/ piercing/ crushing	27	13.6	28	24.8	20	12.3	43	15.5	10	12.2	93	14.6	90	21.0
Collision with animal	12	6.0	16	14.2	2	1.2	5	1.9	7	8.5	80	12.5	30	6.0
Collision, other	34	17.1	17	15.0	19	11.7	37	13.4	9	11.0	65	10.2	50	12.0
Overexertion	19	9.5	8	7.1	21	13.0	8	2.7	4	4.9	10	1.6	<10	<1.0
Animal bite	0	0.0	0	0.0	15	9.3	20	7.2	1	1.2	41	6.4	10	3.0
Transport	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	24	8.7	(NA)	(NA)	(NA)	(NA)	20	6.0
Foreign body	0	0.0	3	2.6	3	1.9	4	1.4	3	3.7	25	3.9	<10	<1.0
Poisoning	0	0.0	0	0.0	3	1.9	7	2.5	0	0.0	2	0.3	0	0.0
Other	7	3.5	0	0.0	7	4.3	0	0.0	5	6.1	6	1.0	<10	<1.0

Table 6(1).continued

Injury descriptive variables														
Type of injury														
Concussion	0	0.0	1	0.9	0	0.0	15	5.4	4	4.9	32	5.0	<10	2.0
Contusion/ abrasion	33	16.6	42	37.2	64	39.5	55	19.9	38	46.3	162	25.4	120	28.0
Open wound	21	10.6	24	21.2	43	26.5	101	36.6	16	19.5	153	24.0	100	23.0
Fracture	104	52.2	21	18.6	29	17.9	58	21.0	0	0.0	137	21.5	160	36.0
Dislocation/ distortion	4	2.0	19	16.8	11	6.8	19	6.7	0	0.0	66	10.3	20	6.0
Muscle/ tendon/ vessel injury	28	14.1	4	3.5	2	1.2	1	0.4	0	0.0	5	0.8	<10	<1.0
Burn	2	1.0	0	0.0	0	0.0	2	0.7	3	3.7	10	1.6	<10	<1.0
Poisoning	2	1.0	0	0.0	0	0.0	9	3.2	1	1.2	2	0.3	0	0.0
Crushing/ amputation	0	0.0	0	0.0	0	0.0	1	0.4	1	1.2	6	0.9	<10	2.0
Other	0	0.0	0	0.0	9	5.6	12	4.3	19	23.2	53	8.3	<10	2.0
No injury	5	2.5	2	1.8	4	2.5	4	1.4	0	0.0	12	1.9	<10	<1.0
Injured body part														
Head and face	16	8.0	18	15.9	34	21.0	73	26.4	21	25.6	149	23.3	60	14.0
Trunk	6	3.0	8	7.1	12	7.4	22	7.9	3	3.6	59	9.3	20	4.0
Upper limb	111	55.8	43	38.1	51	31.5	102	36.8	29	35.4	273	42.8	220	51.0
Lower limb	66	33.2	44	38.9	65	40.1	80	28.9	29	35.4	157	24.6	130	31.0
Outcome														
No treatment	0	0.0	21	18.6	12	7.4	11	4.0	8	9.8	87	13.6		
Treatment	0	0.0	53	46.9	74	45.7	74	26.7			475	74.5	370	87.0
Treatment and follow up	155	77.8	27	23.9	48	29.6	142	51.2	59	71.9	10	1.6	<10	<1.0
Hospitalization	44	22.2	12	10.6	28	17.3	49	17.7	15	18.3	66	10.3	50	12.0
Deceased	0	0.0	0	0.0	0	0.0	1	0.4	0	0.0	0	0.0	0	0.0
Total	199	100.0	113	100.0	162	100.0	277	100.0	82	100.0	638	100.0	430	100.0

* Where data were available
(NA): Not available data

Table 7. Distribution of patients (15+ years old) that sustained HLA farm injuries by studies variables in selected EU countries

Country	**Austria** (1996-2001)		**Denmark** (1998-2002)		**France** (1996-2000)		**Greece** (1996-2000)		**Portugal** (2002)		**Sweden** (1998-2002)		**Netherlands** (1997-2000)	
Demographic variables	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Gender														
Male	344	57.3	165	55.9	240	68.2	1,147	68.1	505	77.8	952	50.4	350	57.0
Female	256	42.7	130	44.1	112	31.8	537	31.9	144	22.2	937	49.6	260	43.0
Age (years)														
15-24	94	15.7	69	23.4	86	24.4	106	6.3	84	12.9	379	20.1	140	23.0
25-34	116	19.3	45	15.3	61	17.3	140	8.3	109	16.8	373	19.7	150	24.0
35-44	84	14.0	64	21.7	44	12.5	213	12.7	107	16.5	360	19.1	100	16.0
45-54	85	14.1	47	15.9	61	17.4	275	16.3	94	14.5	278	14.7	60	9.0
55-64	104	17.4	33	11.2	51	14.5	399	23.7	113	17.4	209	11.1	70	12.0
65+	117	19.5	37	12.5	49	13.9	551	32.7	142	21.9	290	15.3	90	15.0
Event descriptive variables														
Time*														
8.00-11.59	118	19.7	84	28.5	70	19.9	503	29.8	187	28.8	351	21.4	130	22.0
12.00-15.59	162	27.0	82	27.8	86	24.4	550	32.7	200	30.8	497	30.3	160	26.0
16.00-19.59	238	39.7	76	25.8	120	34.1	508	30.2	187	28.8	576	35.1	190	32.0
20.00-7.59	82	13.6	53	17.9	76	21.6	123	7.3	75	11.6	215	13.1	120	20.0
Day														
weekday	401	66.8	191	64.8	212	60.2	1105	65.6	458	70.6	1211	64.1	410	68.0
weekend	199	33.2	104	35.2	140	39.8	579	34.4	191	29.4	678	35.9	200	32.0
Season														
Winter	74	12.3	55	18.6	50	14.2	455	27.0	169	26.0	312	16.5	120	20.0
Spring	147	24.5	67	22.7	100	28.4	401	23.8	155	23.9	500	26.5	160	26.0
Summer	213	35.5	92	31.2	145	41.2	361	21.4	170	26.2	613	32.4	190	32.0
Autumn	166	27.7	81	27.5	57	16.2	467	27.8	155	23.9	464	24.6	130	22.0
Mechanism of injury														
Fall, same level	158	26.4	36	12.2	107	30.4	515	30.6	218	33.6	221	11.7	90	15.0
Fall from height, stairs	78	13.0	41	13.9	39	11.1	445	26.4	18	2.8	263	13.9	110	18.0
Fall, other	62	10.3	4	1.4	1	0.3	18	1.1	81	12.5	49	2.6	60	9.0
Collision with animal	82	13.7	68	23.1	23	6.5	31	1.8	37	5.7	406	21.5	120	20.0
Collision, other	71	11.8	50	16.9	26	7.4	183	10.9	180	27.7	249	13.2	80	13.0
Cutting/ piercing/ crushing	58	9.7	42	14.2	40	11.4	247	14.7	82	12.6	361	19.1	100	17.0
Overexertion	47	7.8	30	10.1	57	16.2	79	4.7	4	0.6	111	5.9	<10	<1.0
Animal bite	9	1.5	9	3.1	37	10.5	94	5.6	2	0.3	102	5.4	20	3.0
Transport	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	34	2.0	(NA)	(NA)	(NA)	(NA)	20	4.0

Table 7(1). continued

Foreign body	0	0.0	8	2.7	9	2.5	26	1.5	13	2.0	88	4.7	<10	<1.0
Poisoning	0	0.0	0	0.0	1	0.3	1	0.1	0	0.0	2	0.1	<10	<1.0
Burn	3	0.5	2	0.7	6	1.7	8	0.5	0	0.0	25	1.3	<10	<1.0
Other	32	5.3	5	1.7	6	1.7	3	0.2	14	2.2	12	0.6	<10	<1.0
Injury descriptive variables														
Type of injury														
Concussion	1	0.2	3	1.0	0	0.0	53	3.1	56	8.6	55	2.9	<10	<1.0
Contusion/ abrasion	90	15.0	100	33.9	126	35.9	540	32.1	337	51.9	473	25.0	220	36.0
Open wound	61	10.2	53	18.0	68	19.3	354	21.0	177	27.4	434	23.0	110	18.0
Fracture	279	46.5	51	17.3	79	22.5	440	26.1	0	0.0	353	18.7	170	28.0
Dislocation/ distortion	13	2.2	64	21.7	51	14.5	205	12.2	0	0.0	255	13.5	70	11.0
Muscle/ tendon/ vessel injury	126	21.0	13	4.4	4	1.1	11	0.7	0	0.0	49	2.6	<10	<1.0
Burn	4	0.6	2	0.7	3	0.8	4	0.2	8	1.2	21	1.1	0	0.0
Poisoning	6	1.0	2	0.7	2	0.6	17	1.0	2	0.3	1	0.1	<10	<1.0
Crushing/ amputation			3	1.0	3	0.8	10	0.6	8	1.2	39	2.0	<10	2.0
Other/ unknown	1	0.1	4	1.3	15	4.2	44	2.6	61	9.4	202	10.7	20	4.0
No injury	19	3.2	0	0.0	1	0.3	6	0.4	0	0.0	7	0.4	<10	<1.0
Injured body part														
Head and face	37	6.2	38	12.9	28	8.0	211	12.5	184	28.3	329	17.4	70	12.0
Trunk	86	14.3	22	7.5	58	16.5	283	16.8	87	13.4	190	10.1	50	8.0
Upper limb	197	32.8	117	39.6	123	34.9	620	36.8	183	28.2	751	39.8	260	43.0
Lower limb	280	46.7	118	40.0	143	40.6	570	33.9	195	30.1	619	32.7	220	37.0
Outcome														
No treatment	0	0.0	42	14.2	5	1.4	11	0.7	24	3.7	184	9.7	0	0.0
Treatment	0	0.0	139	47.1	158	44.9	790	46.9	2	0.3	1459	77.2	540	89.0
Treatment and follow up	285	47.5	94	31.9	119	33.8	634	37.6	527	81.2	36	2.0	<10	<1.0
Hospitalization	315	52.5	20	6.8	70	19.9	247	14.7	95	14.6	210	11.1	60	9.0
Deceased	0	0.0	0	0.0	0	0.0	2	0.1	1	0.2	0	0.0	<10	<1.0
Total	600	100.0	295	100.0	352	100.0	1684	100.0	649	100.0	1889	100.0	610	100.0

* Where data were available
(NA): Not available data

Table 8. Distribution of patients (15+ years old) that sustained farm injuries (two groups: occupational/ leisure injuries) by demographic, accident and injury descriptive variables

Country	**Denmark** (1998-2002)				**Greece** (1996-2000)				**The Netherlands** (1997-2000)			
	Occupational		Leisure		Occupational		Leisure		Occupational		Leisure	
	N	%	N	%	N	%	N	%	N	%	N	%
Demographic variables												
Gender												
Male	1,284	85.0	165	55.9	1,643	69.5	1,147	68.1	1300	89.0	350	57.0
Female	227	15.0	130	44.1	722	30.5	537	31.9	170	11.0	260	43.0
Age												
15-24	389	25.6	69	23.4	210	8.9	106	6.3	240	16.0	140	23.0
25-34	347	23.0	45	15.3	312	13.2	140	8.3	370	25.0	150	24.0
35-44	326	21.6	64	21.7	357	15.1	213	12.7	290	19.0	100	16.0
45-54	199	13.1	47	15.9	395	16.7	275	16.3	220	15.0	60	9.0
55-64	169	11.2	33	11.2	504	21.3	399	23.7	220	15.0	70	12.0
65+	81	5.4	37	12.5	587	24.8	551	32.7	160	10.0	90	15.0
Event descriptive variables												
Time												
8.00-11.59	418	27.7	84	28.5	681	28.8	503	29.9	390	26.0	130	22.0
12.00-15.59	401	26.5	82	27.8	871	36.8	550	32.7	440	30.0	160	26.0
16.00-19.59	412	27.3	76	25.8	704	29.8	508	30.1	410	27.0	190	32.0
20.00-7.59	280	18.5	53	17.9	109	4.6	123	7.3	250	17.0	120	20.0
Day												
weekday	1253	82.9	191	64.8	1731	73.2	1105	65.6	1200	81.0	410	68.0
weekend	258	17.1	104	35.2	634	26.8	579	34.4	280	19.0	200	32.0
Season												
Winter	304	20.1	55	18.6	643	27.2	455	27.0	330	22.0	120	20.0
Spring	377	25.0	67	22.7	591	25.0	401	23.8	400	27.0	160	26.0
Summer	433	28.7	92	31.2	506	21.4	361	21.4	410	27.0	190	32.0
Autumn	397	26.2	81	27.5	625	26.4	467	27.8	360	24.0	130	22.0
Mechanism of injury												
Cutting/ piercing/ crushing	440	29.1	42	14.2	456	19.3	247	14.7	390	26.0	100	17.0
Collision with animal	256	16.9	68	23.0	25	1.1	31	1.8	270	18.0	120	20.0
Collision, other	276	18.3	50	17.0	279	11.8	183	10.9	330	22.0	80	13.0
Foreign body	129	8.5	8	2.7	57	2.4	26	1.5	30	2.0	<10	<1.0
Overexertion	131	8.7	30	10.2	103	4.4	79	4.7	10	<1.0	<10	<1.0
Fall, same level	88	5.8	36	12.2	743	31.4	515	30.6	140	9.0	90	15.0
Fall from height, stairs	90	6.0	41	13.9	503	21.3	445	26.4	160	10.0	110	18.0
Fall, other	27	1.8	4	1.4	10	0.4	18	1.1	100	7.0	60	9.0
Burn	35	2.3	2	0.7	17	0.7	8	0.5	<10	<1.0	0	0.0
Animal bite	29	1.9	9	3.0	100	4.2	94	5.6	30	2.0	20	3.0
Poisoning	3	0.2	0	0.0	3	0.1	1	0.1	10	<1.0	<10	<1.0
Transport	(NA)	(NA)	(NA)	(NA)	69	2.9	34	2.0	0	0.0	20	4.0
Other	7	0.5	5	1.7	0	0.0	3	0.2	10	<1.0	<10	<1.0

Table 8 (1). continued

Injury descriptive variables												
Type of injury												
Concussion	15	1.0	3	1.0	62	2.6	53	3.1	<10	<1.0	<10	<1.0
Contusion/bruises abrasion	484	32.0	100	33.8	740	31.3	540	32.1	340	23.0	220	36.0
Open wound	415	27.5	53	18.0	593	25.1	354	21.0	400	27.0	110	18.0
Fracture	226	15.0	51	17.3	522	22.1	440	26.1	440	29.0	170	28.0
Dislocation/ distortion	213	14.1	64	21.7	221	9.3	205	12.2	160	10.0	70	11.0
Muscle/ tendon/ vessel injury	68	4.5	13	4.4	21	0.9	11	0.7	30	2.0	<10	<1.0
Burn	40	2.6	2	0.7	13	0.5	4	0.2	<10	<1.0	0	0.0
Poisoning	15	1.0	2	0.7	49	2.1	17	1.0	<10	<1.0	<10	<1.0
Crushing/ amputation	18	1.2	3	1.0	16	0.7	10	0.6	20	1.0	<10	2.0
Other	13	0.9	4	1.4	81	3.4	44	2.6	70	4.0	20	4.0
No injury	4	0.2	0	0.0	47	2.0	6	0.4	20	1.0	<10	<1.0
Injured body part												
Head and face	304	20.1	38	12.9	372	15.7	211	12.5	160	11.0	70	12.0
Trunk	87	5.8	22	7.5	379	16.0	283	16.8	110	7.0	50	8.0
Upper limb	674	44.6	117	39.6	863	36.5	620	36.8	760	51.0	260	43.0
Lower limb	446	29.5	118	40.0	751	31.8	570	33.9	460	31.0	220	37.0
Outcome												
No treatment	164	10.9	42	14.2	5	0.2	11	0.7	0	0.0	0	0.0
Treatment	670	44.3	139	47.1	876	37.0	790	46.9	1300	88.0	540	89.0
Treatment and follow up	571	37.8	94	31.9	1124	47.6	634	37.6	10	<1.0	<10	<1.0
Hospitalization	106	7.00	20	6.8	355	15.0	247	14.7	160	11.0	60	9.0
Deceased	0	0.0	0	0.0	5	0.2	2	0.1	<10	<1.0	<10	<1.0
Total	1511	100.0	295	100.0	2365	100.0	1684	100.0	1500	100.0	308	100.0

(NA): Not available data

Table 9. Distribution of adults (15+ years) sustained HLA farm injuries by main object involved in the injury event in selected EU countries

Country	**Austria**		**Denmark**		**France**		**Greece**		**Sweden**		**The Netherlands**	
(Years)	1996-2000		1998-2002		1996-2000		1996-2000		1998-2002		1997-2000	
Object	N	%	N	%	N	%	N	%	N	%	N	%
Raw materials, structural elements and particles	46	4.3	34	9.0	11	2.5	340	14.2	511	14.0	70	9.0
Natural surface	337	31.2	75	19.8	94	21.4	720	30.0	87	2.4	50	6.0
Processed surface outdoors	78	7.2			-	-	170	7.1	191	5.2	10	1.0
Stationary equipment outside	11	1.0			21	4.8	64	2.7	169	4.6	40	5.0
Floor, indoors	53	4.9	24	6.3	1	0.2	2	0.1	127	3.5	40	5.0
Other part of a building	45	4.2			8	1.8	12	0.5	120	3.3	40	5.0
Tool, manual	16	1.5	62	16.4	19	4.3	104	4.3	153	4.2	<10	<1.0
Mechanical tools, machinery	93	8.6			25	5.7	110	4.6	343	9.4	50	6.0
Ladder, scaffold	20	1.9	4	1.1	4	0.9	72	3.0	42	1.2	10	1.0
Horse, donkey	113	10.5	124	32.8	28	6.4	35	1.5	789	21.6	180	23.0
Animal, other	118	10.9			77	17.5	152	6.3	405	11.1	90	12.0
Sports equipment	46	4.3	9	2.4	59	13.4	21	0.9	25	0.7	10	1.0
Tree	12	1.1	13	3.4	8	1.8	356	14.8	35	1.0	<10	<1.0
Means of transport	31	2.9	9	2.4	43	9.8	11	0.5	123	3.4	50	6.0
Other	62	5.7	24	6.3	41	9.3	233	9.7	530	14.5	140	18.0
Total	1081	100.0	378	100.0	439	100.0	2402	100.0	3650	100.0	800	100.0

Table 10. Distribution of adults (15+ years) sustained occupational farm injuries by main object involved in the injury event in selected EU countries

Country	**Denmark**		**Greece**		**The Netherlands**	
(Years)	1998-2002		1996-2000		1997-2000	
Object	N	%	N	%	N	%
Raw materials, structural elements and particles	269	17.6	327	11.2	230	11.0
Natural surface	64	4.2	1020	35.0	40	2.0
Processed surface outdoors			191	6.6	<10	<1.0
Stationary equipment outside			-	-	110	6.0
Floor, indoors	138	9.0	27	0.9	50	3.0
Other part of a building			8	0.3	130	7.0
Tool, manual	425	27.9	181	6.2	60	3.0
Mechanical tools, machinery			335	11.5	300	15.0
Ladder, scaffold	21	1.4	51	1.8	20	1.0
Horse, donkey	408	26.7	27	0.9	60	3.0
Animal, other			131	4.5	430	21.0
Sports equipment	1	0.1	7	0.2	<10	<1.0
Tree	52	3.4	342	11.7	<10	<1.0
Means of transport	30	2.0	30	1.0	90	5.0
Other	118	7.7	235	8.1	450	23.0
Total	1526	100.0	2912	100.0	1990	100.0

Table 11. Distribution of children 0-14 years) sustained HLA farm injuries by main object involved in the injury event in selected EU countries

Country	**Austria**		**Denmark**		**France**		**Greece**		**Sweden**		**The Netherlands**	
(Years)	1996-2000		1998-2002		1996-2000		1996-2000		1998-2002		1997-2000	
Object	N	%	N	%	N	%	N	%	N	%	N	%
Raw materials, structural elements and particles	11	3.3	24	16.2	7	3.5	86	21.2	147	11.8	60	10.0
Natural surface	116	35.3	33	22.3	47	23.3	60	14.8	55	4.4	20	4.0
Processed surface outdoors	20	6.1			1	0.5	50	12.3	75	6.0	<10	1.0
Stationary equipment outside	9	2.7			4	2.0	25	6.2	93	7.5	30	5.0
Floor, indoors	10	3.0	15	10.1	2	1.0	1	0.2	50	4.0	20	4.0
Other part of a building	18	5.5			4	2.0	5	1.2	40	3.2	40	7.0
Tool, manual	5	1.5	28	18.9	4	2.0	19	4.7	41	3.3	<10	<1.0
Mechanical tools, machinery	40	12.2			23	11.4	11	2.7	44	3.5	70	12.0
Ladder, scaffold	2	0.6	2	1.4	-	-	-	-	12	1.0	<10	<1.0
Horse, donkey	24	7.3	28	18.9	8	4.0	3	0.7	278	22.3	60	10.0
Animal, other	14	4.3			19	9.4	25	6.2	88	7.1	40	7.0
Sports equipment	17	5.2	3	2.0	25	12.4	13	3.2	30	2.4	10	2.0
Tree	6	1.8	1	0.7	2	1.0	24	5.9	8	0.6	-	-
Means of transport	12	3.6	2	1.4	27	13.4	16	3.9	79	6.4	40	7.0
Other	25	7.6	12	8.1	29	14.4	68	16.7	204	16.4	180	31.0
Total	329	100.0	148	100.0	202	100.0	406	100.0	1244	100.0	590	100.0

EXPLOITATION OF EUROSTAT DATA

Farm injuries usually go unnoticed by the routine surveillance systems. Reluctance in declaring a farm injury as occupational, especially if it occurs among members of a family farming business, results in underreporting of the problem. Preliminary analysis of the Greek EHLASS data (current IDB) showed that injuries during farm activities that are registered in the former EHLASS database, are usually miss- classified as leisure ones. The E-code has been blamed for its taxonomic deficiencies in terms of utilizing the information as a basis for prevention. For example, the incapacity for separating injuries taking place at work and during leisure time, lack of information concerning place and time of injury and so on.

The Project provided a unique opportunity to explore the dimensions of the problem and to identify major risk factors and vulnerable population groups. Additional data sources were exploited in collaboration with EUROSTAT to check the feasibility of including information on farm injuries and test them for completeness, accuracy and comparability.

EUROSTAT provides statistics for several variables on occupational injuries, i.e. incidence rates, relative incidence rates by economic activity, fatality rates by economic activity, standardized incidence rates by economic activity, age, gender, employment status, weekly hours of work, educational attainment level, size of the enterprise and severity. These data provided valuable information for identifying certain aspects of the burden of farm injuries. EUROSTAT data, however, does not includes information concerning the injury mechanism, the activity during the injury event, the main objects involved, the outcome, which are essential in order to have a global view of the problem and establish effective preventive

measures. Nevertheless, the main points extracted after studying EUROSTAT data (European social statistics. Accidents at work and work- related health problems, Data 1994-2000. European Commission.) are the following ones:

- Incidence rate of *occupational farm injuries* with more than 3 days of absence **raised 8.7%** during 1994-1999, whereas at the same time occupational injuries in manufacturing and construction reduced by 11.8% and 13.4%, respectively.
- Among the participating countries in the project, **Portugal** (5,048/ 100,000) and **France** (4,991/ 100,000) had the *highest standardized incidence rates of occupational farm injuries* and **Sweden** the lowest ones (1,425/ 100,000).
- The incidence rate of fatal farm injuries during 1994-1999 was less declined (5%) than the respective ones in manufacturing (26.1%) and construction (20.4%) sectors.
- The standardized incidence rates of occupational farm injuries in both genders were higher than the respective ones in manufacturing and construction.
- The standardized incidence rate of fatal farm injuries was *increased with increasing age* and was highest among people aged 55-64 years old (20.9/ 100,000). It is worth noting that EUROSTAT data involved people less than 65 years old. This pattern was noticed in all participating countries, with the exception of Greece, where the age group 45-54 had the highest mortality rate. Greece, had the highest mortality rates for farm occupational injuries (6.3/ 100,000) among the participating countries in the project, followed by Portugal (6.1/ 100,000).
- The standardized incidence rates of occupational farm injuries among employees, employers and self- employed, family workers were respectively higher with the ones recorded in manufacturing and construction.

- The number of occupational farm injuries (fatal and non-fatal ones) was higher in farms with less than 10 employees.
- The number of occupational farm injuries (fatal and non-fatal ones) was higher among employers and self-employed.

Table 12. Accidents at work with more than 3 days absence by economic activity and year in 15 EU member states (Data source: Eurostat)

	IR (per 100,000 people)						Evolution of IR (%)
	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**1994-1999**
Agriculture	6496	6123	6771	6647	6790	7060	8.7
Manufacturing	5071	4962	4660	4607	4492	4471	-11.8
Construction	9014	9080	8023	7963	8008	7809	-13.4

Table 13. Fatal accidents at work by economic activity and year in 15 EU member states (Data source: Eurostat)

	IR (per 100,000 people)						Evolution of IR (%)		
	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**1994-1999**	**1996-1999**	**1998-1999**
Agriculture	14.0	13.8	12.9	12.6	12.4	13.3	-5.0	3.1	7.3
Manufacturing	4.6	4.2	3.9	4.0	3.7	3.4	-26.1	-12.8	-8.1
Construction	14.7	14.8	13.3	13.1	12.8	11.7	-20.4	-12.0	-8.6

Table 14. Standardized incidence rate of accidents at work by Member State and year. (> 3 days absence, number per 100 000 employed persons) (Data source: Eurostat)

	EU 15	**Austria***	**Denmark**	**France**	**Greece**	**Portugal**	**Sweden**	**The Netherlands**
1994	4539	3554	2653	5515	3702	7361	1123	4287
1999	4088	3301	3031	4991	2740	5048	1425	4223

*1994 rate = 1996

Table 15. Standardized incidence rate of fatal accidents at work by Member State and year (per 100 000 employed persons)* (Data source: Eurostat)

	EU 15	Austria*	Denmark	France	Greece	Portugal	Sweden	The Netherlands
1994	3.9	3.4	2.8	4.3	4.3	8.4	2.1	-
1999	2.9	5.1	2.2	3.4	6.3	6.1	1.1	2.3

*road traffic accidents on board of any means of transport in the course of work excluded

Table 16. Annual index of the incidence rate of accidents at work with more than 3 days absence. Evolution of the standardized incidence rate by member state and year (Index 1998 = 100) (Data source: Eurostat)

	1994	1995	1996	1997	1998	1999
EU 15	111	104	103	100	100	100
Austria	158	164	107	105	100	99
Denmark	83	82	84	100	100	95
France	112	104	101	101	100	101
Greece	126	118	129	113	100	93
Portugal	107	109	109	100	100	92
Sweden	84	76	92	81	100	107
The Netherlands	110	108	109	107	100	108

Table 17. Annual index of the incidence rate of fatal accidents at work. Evolution of the standardized incidence rate by member state and year
(Index 1998 = 100, except NL 1999 = 100) (Data source: Eurostat)

	1994	**1995**	**1996**	**1997**	**1998**	**1999**
EU 15	115	109	106	100	100	85
Austria	104	131	118	104	100	100
Denmark	90	106	97	74	100	71
France	108	88	90	103	100	85
Greece	116	116	100	76	100	170
Portugal	109	103	127	108	100	79
Sweden	162	177	162	169	100	85
The Netherlands	-	-	114	122	100	111

Road traffic and transport accidents in the course of work excluded

Table 18. Relative incidence rate of accidents at work by economic activity in 15 EU member states, 1999, EU- 15 mean = 100 (Data source: Eurostat)

Type of activity	IR
Fishing	243
Construction	191
Agriculture	173
Transport	139
Health	134
Mining	112
Manufacturing	109
Hotels	91
Trade	61
Financial Business	44
Energy	35

Table 19. Standardized incidence rate of accidents at work by economic activity, sex and severity, 1999 (Data source: Eurostat)

Type of activity	**EU 15**		
	Males	*Females*	*Total*
	More than 3 days absence		
Agriculture	7897	5193	7060
Manufacturing	5389	2053	4471
Construction	8545	2326	7809
	Fatal accidents		
Agriculture	18.1	2.8	13.3
Manufacturing	4.5	0.8	3.4
Construction	12.9	1.4	11.7

Table 20. Standardized incidence rate of accidents at work by economic activity, Member State and sex, 1999, more than 3 days of absence (Data source: Eurostat)

	EU 15	**Austria**	**Denmark**	**France**	**Greece**	**Portugal**	**Sweden**	**The Netherlands**
					Males			
Agriculture	7897	16417	2039	6007	3467	3800	1585	-
Manufacturing	5389	4360	5938	5369	5137	10292	1969	-
Construction	8545	6739	4455	12415	6323	8518	2648	-
					Females			
Agriculture	5193	6755	2119	3014	421	1143	1037	-
Manufacturing	2053	1565	3080	2160	1732	2605	1218	-
Construction	2326	896	988	934	3427	4689	401	-
					Total			
Agriculture	7060	11678	2056	5175	2500	2682	1450	7133
Manufacturing	4471	3637	5011	4412	4034	6733	1777	5741
Construction	7809	6311	4062	11409	6247	8370	2430	2721

Table 21. Standardized incidence rate of accidents at work by Member State and age, 1999, more than 3 days of absence. (Data source: Eurostat)

EU 15	**18-24**	**25-34**	**35-44**	**45-54**	**55-64**	**Total**
Austria	4140	2785	2889	3009	4607	3301
Denmark	3487	3417	3307	3119	2730	3031
France	8061	5105	4154	3744	4841	4991
Greece	2626	2783	2853	3448	3431	2740
Portugal	4154	3670 (25-44)		6828 (45-64)		5048
Sweden	1416	1276	1314	1370	1594	1425
The Netherlands	6890	3920	3105	2634	2307	4223

Table 22. Standardized incidence rate of accidents at work by economic activity, age and severity (more than 3 days absence) in EU 15, 1999 (Data source: Eurostat)

	Age group							
Type of activity	**<18**	**18-24**	**25-34**	**35-44**	**45-54**	**55-64**	65+	Total
Agriculture	4041	8238	6811	6755	6347	7465	8447	7060
Manufacturing	3637	6709	4727	3967	3787	3409	7871	4471
Construction	4809	10726	7993	7145	6676	6428	10607	7809

Table 23. Standardized incidence rate of fatal accidents at work by economic activity, age and severity in EU 15, 1999 (Data source: Eurostat)

	Age group					
Type of activity	18-24	25-34	35-44	45-54	55-64	Total
Agriculture	6.2	8.5	8.9	12.2	20.9	13.3
Manufacturing	3.3	2.5	3.2	3.8	4.9	3.4
Construction	8.3	9.4	10.2	14.9	19.2	11.7

Table 24. Standardized incidence rate of fatal accidents at work by Member State and age, 1999 (Data source: Eurostat)

	Age group					
Type of activity	18-24	25-34	35-44	45-54	55-64	Total
EU 15	1.5	1.6	1.7	2.6	3.5	2.9
Austria	2.2	2.4	3.0	5.5	9.4	5.1
Denmark	0.9	0.9	1.5	1.7	2.2	2.2
France	1.5	1.2	1.8	2.9	4.5	3.4
Greece	4.5	3.9	4.5	10.4	6.8	6.3
Portugal	4.1	3.7 (25-44)		7.4 (45-54)		6.1
Sweden	0.7	0.5	0.5	0.4	2.3	1.1
The Netherlands	-	-	-	-	-	2.3

Road traffic and transport accidents in the course of work excluded

Table 25. Standardized incidence rate of accidents by economic activity, employment status and severity, EU 15, 1999 (Data source: Eurostat)

	Employees	Employers and self-employed	Family workers	Total
Type of activity		*More than 3 days absence*		
Agriculture	6667	7925	5528	7039
Manufacturing	4527	4443	716	4502
Construction	8187	6027	1251	7801
		Fatal accidents		
Agriculture	13.1	14.5	9.8	13.3
Manufacturing	3.3	3.7	2.7	3.3
Construction	12.1	9.6	1.6	11.6

Table 26. Number of accidents at work by economic activity, sex and severity, 1999 (Data source: Eurostat)

	EU 15			
	Males	Females	Unknown	Total
Type of activity	*More than 3 days absence*			
Agriculture	274005	80659	7074	361736
Manufacturing	1111277	170564	60459	1342302
Construction	813022	21273	11020	845315
All sectors	3649441	945142	192315	4786898
	Fatal accidents			
Agriculture	627	43	12	682
Manufacturing	931	63	15	1009
Construction	1227	13	26	1266
All sectors	4853	322	100	5275

The line totals are not always exactly equal to the sum of the detailed numbers because, for Member States having reporting levels< 100%, these numbers are based on rounded estimates

Table 27. Number of accidents at work by economic activity, age and severity, 1999 (Data source: Eurostat)

	EU 15									
	<18	18-24	15-34	35-44	45-54	55-64	65+	Unknown	Total	Employment (1000)
Type of activity	*More than 3 days of absence*									
Agriculture	2667	38801	77309	81534	74578	61435	20965	4717	361736	5124
Manufacturing	13130	225885	417331	315788	254460	89918	11649	14141	1342302	30021
Construction	9329	150373	254107	197556	148599	63701	7107	14543	845315	10826
All sectors	47960	801447	1401565	1143664	884913	380654	54988	71707	4786898	139377
	Fatal accidents									
Agriculture	2	29	97	107	143	172	110	22	682	5124
Manufacturing	9	112	219	257	257	129	17	9	1009	30021
Construction	6	116	299	282	331	190	23	19	1266	10826
All sectors	26	463	1156	1223	1364	783	183	77	5275	139377

Table 28. Number of accidents at work by economic activity, size of the local unit of the enterprise and severity, EU 15+ Norway, 1999 (Data source: Eurostat)

	Employees								
Type of activity	0*	1-9	10-49	50-249	250-499	250+	500+	Unknown	Total
	More than 3 days of absence								
Agriculture	3869	35308	12112	9735	2256	4487	2231	297420	362931
Manufacturing	25599	116452	203084	207236	69243	145440	76197	667379	1365190
Construction	37806	153105	140957	62863	9907	17902	7995	441662	854295
All sectors	115724	531649	628857	542374	164934	425474	260540	2627510	4871588
	Fatal accidents								
Agriculture	36	104	17	8	2	6	4	516	687
Manufacturing	31	160	217	145	46	102	56	360	1015
Construction	79	330	248	100	23	49	26	466	1272
All sectors	248	1124	892	492	130	355	225	2194	5305

*Self- employed without employees

Table 29. Number of accidents at work by economic activity, employment status and severity, EU 15+ Norway, 1999 (Data source: Eurostat)

	Employees	Employers and self-employed	Family workers	Other	Unknown	Total
Type of activity	*More than 3 days of absence*					
Agriculture	98098	88934	16363	1603	157933	362931
Manufacturing	722105	35650	651	23630	583154	1365190
Construction	413664	55636	593	19114	365288	854295
All sectors	2502680	230127	18089	78637	2042055	4871588
	Fatal accidents					
Agriculture	234	197	35	8	213	687
Manufacturing	649	36	3	33	294	1015
Construction	797	115	1	24	335	1272
All sectors	3182	448	41	111	1523	5305

Table 30. Number of accidents at work by economic activity and severity, EU 15+ Norway, 1999 (Data source: Eurostat)

	More than 3 days of absence									*Fatal*
Type of activity	4-6 days lost	7-13 days lost	14-20 days lost	21 days to less 1 month lost	1 to less 6 months lost	3 to less 6 months lost	6+ months lost	Unknown	Total	
Agriculture	16464	42233	29211	22216	46462	4604	9080	192661	362931	687
Manufacturing	130795	221996	106968	68488	143899	15626	19854	657564	1365190	1015
Construction	66397	129099	65550	44287	112086	13512	16400	406964	854295	1272
All sectors	403358	720312	372856	249687	558484	68547	80500	2417844	4871588	5305

Table 31. Relative incidence rate of accidental injuries at work by economic activity of the employer, weekly hours of work and sex, EU 11+ Hungary, 1999, (Data source: Eurostat)
EU mean rate = 100

	10-19 hours	**20-29 hours**	**30-39 hours**	**40-49 hours**	**50+ hours**	**Total**
Type of activity			*Males*			
Agriculture	295	101	114	149	87	123
Manufacturing	161	205	67	164	82	137
Construction	178	118	97	180	104	163
All sectors	195	123	80	134	68	115
			Females			
Agriculture	232	76	97	82	73	87
Manufacturing	57	38	36	77	56	65
Construction	-	15	31	42	-	32
All sectors	140	72	63	72	48	74
			Total			
Agriculture	259	87	106	129	83	112
Manufacturing	83	78	59	141	78	118
Construction	75	58	89	173	101	154
All sectors	151	82	72	114	64	100

Including accidents that did not lead to an absence from work or resulted in less than 4 days absence from work

Table 32. Relative standardized incidence rate of accidental injuries at work by educational attainment level, Member State and sex, 1999, mean rate for each Member State = 100 (Data source: Eurostat)

	Denmark	**Greece**	**Sweden**
Education level		*Males*	
Less than upper secondary (L)	186	201	89
Upper secondary level (M)	121	123	119
Third level (H)	46		71
Total	113	141	99
		Females	
Less than upper secondary (L)	79	37	90
Upper secondary level (M)	74	17	98
Third level (H)	85	52	113
Total	78	32	102
		Total	
Less than upper secondary (L)	149	144	89
Upper secondary level (M)	102	81	111
Third level (H)	60	19	87
Total	100	100	100

FARM INJURY INDICATORS

The fact that injuries are preventable and predictable has bolstered the growth of public health field of injury control. As predictable events responsible for many years of potential life lost, injuries represent a problem amenable to change though injury control and prevention measures. One of the targets of this project was to develop and recommend public health indicators for assessment of the public health burden due το farm injuries in the Member States. For the recommendation of indicators, however, in the farm field, there is need for clarification of farm work, since this entails activities beyond the conventional working hours, involves persons of all ages and an agreed definition of farm setting.

The list of recommended public health indicators is shown below:

Indicator	**Sources of information**
Mortality rates	
Overall mortality rates Proportional mortality rates (from total deaths, total occupational deaths)	IDB (former EHLASS), National Mortality Register (WHO), Central Bureau of Statistics
Specific mortality rates by age by gender by cause	IDB, Central Bureau of Statistics
Morbidity rates	
Hospital diagnosis (cause, type of injury and injury body part)	IDB, Hospital Discharge Data Trauma Registries

Emergency Rooms visits	IDB, ER records Surveillance systems
Reported injuries By type of farm activity object (machinery, tools, fire, livestock, chemicals etc.) status (owner, visitor, family) age gender	IDB, Surveys Surveillance
Impact of farm injuries	
Limitation of activities Absenteeism from work	Labour Statistics (EUROSTAT), Social security Insurance, Surveys
Preventive measures	
Percentage of personnel receiving safety training Personal farm safety practices (protective gear, etc) Environmental safety practices (fences, etc) Machinery and vehicle safety (Roll Over Protection Structures - ROPS, maintenance etc.) ROPS, maintenance etc) Performance of safety checks	Surveys Observations

Denominators for Mortality and Morbidity rates should be defined for the total population and for x number of workers. Whenever available, exposure should be considered

The overall **mortality rate**, that is the number of deaths per 100,000 people, can be deducted from the IDB (former EHLASS), in those EU countries, which gather nationally representative data through this injury surveillance system. This valuable indicator for the estimation of the trend and the burden of farm injuries is, however underestimated, due to the fact that many cases of fatal farm injuries (when the victim dies at the accident site) are not recorded in this surveillance system, as the emergency departments will not cover these victims. Thus, it only captures deaths that occur in the collaborating hospitals of the network. Mortality rates are also available in National Mortality Registers (WHO). Nevertheless, in this case deaths are

recorded by external cause and not by the place of injury occurrence, thus they are not specific for farm fatal injuries. In IDB, it is possible to estimate specific mortality rates, with the limitation mentioned above, in relation with the age, the gender and the external cause of the injury event.

National registries with representativeness (IDB, Hospital Discharge data, Trauma Registries) provide **morbidity data** (cause, type of injury, injured body part) that allow the estimation of visits of people due to farm injuries and thus, the burden of this problem and its cost indirectly. Morbidity data by type of farm activity, object involved in injury event, age and gender of the victim are available in IDB, whereas information for the employment and family status is available in Labour Statistics (EUROSTAT).

The impact of farm injuries can be estimated with the limitation of man's activities and the **absenteeism from work**. These indicators are available for occupational farm injuries in Labour Statistics, Social Security Insurance and surveys. Labour Statistics from EUROSTAT record farm injuries that cause more than three days of absence thus captures more severe occupational farm injuries.

Finally, through surveys preventive measures for farm injuries can be estimated with indicators referring to the percentage of personnel that receives safety training courses, that uses personal farm safety practices, that implements environmental safety practices.

FARM INJURIES IN THE EU: DISCUSSION OF RESULTS AND RECOMMENDATIONS FOR PREVENTION AT EU LEVEL

COMMUNITY ADDED VALUE OF THE PROJECT*

European Commission plays a vital role in planning and implementing health strategies. Generally speaking, its public health strategy is based on improvement of information about health, creation of a mechanism for a rapid response to major health issues and understanding the factors, which can affect health. To ensure the scientific basis of this public health strategy, the EU spends million of euros annually.

Agriculture is an essential part of the economy of the EU. Farm settings present an environment with many peculiarities that may hide dangers for people living there temporary or permanently. This fact, combined with the burden that injuries cause, not only in financial terms but in social too, justify the significance of this Project.

A reduction of mortality from farm injuries could be achieved in two ways: **by decreasing the fatality of such injuries**- for which appropriate therapy is essential-, or by **diminishing the incidence of farm accidents**- that is the object of injury prevention measures. Although treatment has been considered to be more effective in public's conscience, it is a fact that prevention (primary and secondary) overcomes treatment in long-term periods. Injuries pose much more burden than most diseases and are the **number 1** cause of death of people younger than 35 years of age. However, much more attention and funding have been dedicated to the diagnosis of rare diseases, such as Creutzfeld-Jacobs disease, based on their

potential to become epidemic and their increase fatality, while injuries that are most important both in terms of mortality and morbidity have been somehow neglected.

Through the first Injury Prevention Program 1999-2003, the European Union (EU) became a major supporter of the crucial but neglected field of injury prevention. This program built a network of European Union experts and a good quality injury database covering about half of the EU population. In addition, epidemiological knowledge focusing on different types of injuries, their patterns, causes and implications for the public health sector was made available. Through this Program, the possibility to explore and tackle in terms of proposing preventive strategies, one of the most fatal types of injuries, namely farm injuries, was provided.

Farm is a unique setting. Farm may be the home, the place where holidays are taken, and is perceived to be a place of adventure. Farm injuries are usually not appropriately reported- especially those occurring during leisure time- and this leads to the underestimation of the problem (Cameron et al, 1992).

During the project "Magnitude and Spectrum of Farm Injuries in the European Union country", the opportunity to explore the data provided by former EHLASS (currently called IDB) was provided. This database is specialized on monitoring and recording leisure-time injuries in a uniform way at EU level. It has high quality data, as internationally unanimously accepted coding systems are used, and the personnel involved in the data collection process is specially trained in this sense. Moreover, some countries participating in the EHLASS system have managed to include additional variables- for national purposes- and enrich this important injury surveillance system. Also, the European Statistical Service (EUROSTAT)

made available data concerning occupational farm injuries, which were also exploited during this Project.

Most important findings resulted from the multiple analyses of data (provided by these sources) that were performed are summarized as follows.

Former EHLASS data (IDB) analyses

- Overall, **Injury Data Base (IDB)** has been proved to be effective in capturing farm leisure injuries in all participating EU countries. The patterns of these accidents follow the model of farming activities characteristic for each country, fact that brings evidence about the *high quality of IDB database* and raise important *challenges for injury prevention.*
- Farm injuries are in approximately 50% of cases *falls*, injuries that many times results in traumas of high severity, such as concussions and fractures (as seen in the analyses that were performed), and need more extensive therapeutical procedures. It is very important to note the higher severity of farm injuries when compared to other home and leisure injuries.
- Children and adults living or visiting farms are exposed to different hazards, such as sharp instrument and farm animals.
- EU countries that base their agriculture on cultivation and exploitation of olive oil and fructiferous trees, such as for Greece and Portugal, had an important proportion of fall (from height) injuries, while other countries, such as Sweden that have more animal-related farming activities, had more animal related injuries and falls from collision with animals.

- Concerning the *registration process of farm injuries*, EHLASS coding system seems efficient in capturing farm injuries, and describing their patterns in terms of mechanism of injury, type of injury, injured body part, and outcome. There is, however, a misclassification of some farm accidents that are purely related to farming activities as leisure activities, and thus, captured by IDB. This is because farm injuries- even occurring during work process- are classified as "leisure injuries" when the person sustaining the accident is not a paid for the respective work or works during his/her free time.
- At European level, recommendations should be given for implementing specific protocols and forms in medical settings for identifying and appropriately recording farm injuries. Uniform high quality coding systems should be used at EU level, which is a necessary condition for studying and comparing data concerning farm injuries from different countries. A recommendation should be specifically made when concerning *farm occupational injuries*- so that their classification will be made based on: 1. *job* of the persons involved in the accident and whether the injury occurred during work time (as it is currently coded by different Labour Surveillance Systems in participating countries); and 2. *specific activity* (e.g. farm occupational activity during leisure time), so that a demarcation could be made to specifically "isolate" pure leisure injuries from those related farm occupational activities.
- Development of a EU-wide initiative to improve the quality of data on farm injuries during leisure time. Coding systems should be reviewed with reference to their preventive utility i.e. ICD-9, ICD-10. Emphasis should be given to the lack of appropriate morbidity data. Injury Database (former EHLASS, currently IDB) or other databases, which are relevant to prevention, should be further reinforced to strengthen their ability to capture

rapidly the trends of a phenomenon, therefore, design and implement preventive measures accordingly.

- Scientific efforts, such as epidemiological research on farm injury and prevention should be encouraged, since till now little research on the respective field has been undertaken in EU.
- Farm safety networks should be developed and implemented. EU Injury Prevention Commission, professionals and academics involved in the field of Injury Prevention should collaborate in developing policies of Safety in Farm settings, emphasizing not only to occupational farm injuries but also to injuries during home and leisure activities.

RECOMMENDATIONS FOR PREVENTION

In principle, there are two basic ways of tackling the problem of farm injuries. The *primary objective* should be to prevent dangerous situations arising and the second to reduce the injury effects. The former does not exclude the latter as the prevention of all injuries is possible only in a theoretical basis. Therefore, preventive strategies concerning targeting farm injuries should be promoted, focusing on the following directions:

1. **Exploitation of farm injury data** provided by different data sources, to contour the epidemiological pattern of farm injuries in each setting. When these sources are not available, creation of a national data system to monitor these injuries should be considered, following the model of IDB database. All EU Countries should be encouraged to partner in this effort and share information and experiences.
2. **Organization of National and EU campaigns** referred to farm injuries prevention, with the collaboration of scientists, governmental and private organizations and mass media. Several means could be used to disseminate the knowledge regarding this public health issue, such as educative leaflets, radio and TV messages, scientific conferences. Emphasis should be given to the production of audiovisual material, such as farm safety videos to complement the training courses, will allow a more flexible delivery of the safety messages in farm settings, especially to those being in remote farms, and present them in a farmer friendly manner. The information should aim at convincing people of the importance of adapting safe behaviour in farm environment. Safety education alone, however, is unlikely to reduce injuries unless unsafe conditions are modified. Agricultural educational instructors need to emphasize teaching of skills in hazard

recognition, identification, and control. Campaigns, when they form part of a long- term strategy, they can stimulate people to take appropriate actions.

3. **Increasing awareness of adults** about the dangers that children living in farms face. Parents should be provided with a range of flexible childcare suggestions to reduce the risk of injuries, e.g. appropriate adult supervision, especially when the children enter animal pens, provision of enclosed play spaces away from work areas, checking a work area for the presence and location of children before starting to operate any machinery, prohibition to children from operating farm machinery, storing farming equipment, such as bailers, rakes and small tools in locked areas when are not in use etc.
4. **Emergency Care and Rehabilitation**: The emergency medical services system should be improved to provide the best possible emergency care, medical assessment, and access to tertiary care for farmers residing in rural areas. Every year many farm individuals die, or their injuries are aggravated after a farm accident because they were either not located promptly, or the first individuals to arrive upon the scene were not prepared to aid them. Planning which establishes check- in times, work locations, and emergency procedures will reduce the potential for a fatal farm accident. In addition, communication devices such as cell phones and radios may facilitate a call for help and can greatly increase changes for rescue.
5. **Develop/ Adapt and Apply Guidelines for Children** working on the Farm: Each child has unique characteristics that develop over time. Because the wide variation in children's growth and development as well as the diversity of agricultural practices, specific recommendations for children's work in agriculture cannot be based on age. By using these guidelines adults can match up a child's physical and mental abilities with the tasks involved in completing different agricultural jobs.

6. **Development of Paediatric Training Programs** concerning the importance of childhood and adolescent agricultural health and safety issues. Injured children who receive care at trauma centres certified to treat children have better survival rates than children treated at adult trauma centres. The better outcomes may occur because paediatric trauma centres provide care specifically tailored to children, rather than following medical practices designed for adults.
7. **Evaluation of Effectiveness of Farm Injury Prevention Initiatives**: Monitoring and evaluation of farm health and safety programs plays an important role in reaching the common goal of improving health outcomes for farmers, form workers and their families. The role includes contributing to development and refinement of programs, determining their effectiveness, identifying unanticipated disadvantages and providing an evidence base for prioritisation of resource allocation.

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