Migrant Agricultural Workers and Their Socio---economic, Occupational and Health Conditions– A Literature Review

Svensson, Måns; Urinboyev, Rustamjon; Wigerfelt Svensson, Anders; Lundqvist, Peter; Littorin, Margareta; Albin, Maria

2013

Migrant Agricultural Workers and Their Socio-economic, Occupational and Health Conditions– A Literature Review

By
Svensson M, Urinboyev R, Wigerfelt Svensson A, Lundqvist P, Littorin M, Albin M

Abstract

Objective
This study provides the summary of current knowledge about migrant work in agriculture available from journal articles, books, reports and other relevant academic publications, focusing on political, economic, legal, social and medical aspects of migrant work in agriculture.

Methods
A systematic search was carried out on the *LibHub* and *Google Scholar* databases in order to compile the existing peer-reviewed publications, research reports, and policy papers concerning migrant work in agriculture. The literatures was selected through the following process: (1) reading the title and abstract in English for the period 1960 – 2011; (2) reading the entire text of selected articles; (3) making a manual search of the relevant quotations in the selected articles; (4) eliminating articles without a focus on migrant populations and the themes of central interest, and then reading and analyzing the definitive set of articles.

Results
In spite of their varying geographical focus, scope, unit of analysis and settings, most of the studies reviewed highlighted that migrant farmworkers work under very poor working conditions and face numerous health and safety hazards, including occupational chemical and ergonomic exposures, various injuries and illnesses and even death, discrimination and social exclusion, poor pay and long working hours, and language and cultural barriers. Many studies also reported poor enforcement of labour regulations and a lack of health and safety training on the farms, difficulty accessing medical care and compensation when injured or ill.

Conclusions
The studies have also pointed out the lack of research in relation to labour, health, psychosocial, and wage conditions of migrant farmworkers. The accumulated results of the study indicate that the issues and problems migrant farmworkers face are multidimensional, and there is a need for both policy development and further research in order to address migrant workers' problems.

Keywords
Migration; work environment; agriculture; health of migrant workers; human rights and migration; pesticides; occupational injuries; migrant farmworkers; occupational safety and agriculture; labour migration.

Introduction

The world has seen a drastic increase in the global movement of labour over the last few decades, and there are far more international migrants in the world today than ever previously recorded, approaching 214 million according to UN DESA (1). Current demographic indicators and economic interdependence signal that immigration will increase in the near future to even higher levels, as the population in developed countries is ageing, and there will be a high demand for migrant workers to perform the work in those countries, particularly in low-skilled jobs. According to the United Nations (2), the countries or regions receiving the largest numbers of immigrants are low-birth rate countries, such as the United States, Canada, Western Europe, the Middle East, Australia and Russia. Conversely, the biggest numbers of migrants leave countries with high birth rates, such as Mexico, China, India, Pakistan, and the Philippines. Being already established countries of immigration, the United States, Canada, New Zealand and Australia receive the vast majority of migrant workers compared to other migrant destinations. A recent report by the International Organization for Migration shows that there is a considerable flow of low and semi-skilled migrant workers to middle-income countries, including Argentina, Costa Rica, Malaysia, South Africa and Thailand (3). There is also a significant migration flow from countries of South and South-East Asia to the oil-producing Gulf Cooperation Council (GCC) States, such as United Arab Emirates, Saudi Arabia and Kuwait (4).

According to International Labour Organization (ILO) estimates, 1,3 billion workers worldwide are involved in the agricultural sector (5). In some regions of the United States, such as California, the percentage of migrant agricultural workers is closer to 90 per cent (47). In this regard, the associated labour and health risks of these migration trends in the developed countries have been highlighted in both academic and policy circles. Not being nationals of the state in which they work, migrant agricultural workers are less protected against the state's arbitrary or unjust exercise of authority and against its employers' whims than are national workers. Migrant agricultural workers are often less protected by regulations governing the workplace, not familiar with dominant culture and language, lack formal education, live in poverty, excluded from many statutory social security benefits, and are rarely represented by labour unions.

Although the number of migrant workers employed in agriculture is drastically increasing on the global level, reviews on migrant agricultural workers and their socio-economic, occupational and health conditions are rare and with a limited geographical scope. Hence, there is a growing need to compile state-of-the-art knowledge concerning the labour and health conditions of migrant workers in this sector. Looking into migration trends in different countries and regions, it is possible to obtain a broad view of migration as a global phenomenon. Even though every country or region has its peculiarities, reviewing the literature on global migration trends may shed light on the commonalities that can exist among different migrant-receiving countries, and could direct further research and policy-making at a structural level. Armed with this understanding, our study aims to compile the existing knowledge on migrant workers in agriculture by undertaking an exhaustive literature review, available from peer-reviewed articles, books, research reports, and other academic publications. An attempt will be made to determine what is known and what has been left unstudied. The study aims to provide a summary of the studies included and the issues they raise, in order to allow readers to focus on issues depending on their interest and to critique and apply these issues accordingly in their own context.

Methods

In this literature review, we consider 'migrant workers' to mean temporary, seasonal and non-national labour, but not permanent settlers into the population. Abella's (6) definition of temporary migrants as 'those whose legal status is temporary, regardless of the amount of time they may actually have stayed in a country' is relevant. This definition was selected to specify the scope of our study. A systematic search was carried out on *LibHub* (Lund University's library tool for searching books, e-books, journals and dissertations) and *Google Scholar* in order to compile the existing peer-reviewed publications, research reports, and published papers concerning migrant work in

agriculture. The keywords used, related to migration, were entered into the search engines in a disjunctive manner (OR), and the addition (AND) of a second list of words related to agriculture and medicine, accumulated *390 articles* in total. We entered the following keywords in the databases *LibHub* and *Google Scholar* for the search of relevant literatures: *migrant workers in greenhouse agriculture; immigrants and agriculture; migrant workers in agriculture; farmworkers; agricultural workers; guest workers; seasonal workers; occupational safety and agriculture; migrant workers and pesticides; migrant farmworker or agricultural worker; migrant workers and health; human rights and migration; migrant; foreign worker and agriculture; labour migration; and illegal or undocumented migrant.* Literature was selected through the following process: (1) reading the title and abstract in English for the period 1960 – 2011; (2) reading of the entire text of selected articles; (3) making a manual search of the relevant citations in the selected articles; (4) eliminating articles without a focus on migrant populations and the themes of central interest (migration, work environment in agriculture, health of migrant workers, legal aspects of migration), and (5) reading and analyzing the definitive article set. Our selection criteria were mainly theme-based, and we did not employ quality standards for inclusion. Rather, we made an attempt to compile the existing reports on the topic. We obtained the full text of the most interesting studies *(190),* and followed up cited references in those studies that seemed relevant for our research theme, obtaining a total of *360 papers* in full text. One hundred and twenty three were excluded after the entire document was read. At the end of this process, the number of studies included was *237.*

Results

The geography, scope and focus of the studies were not straightforward and necessitated careful consideration and selectivity. The natures of selected 237 studies are often multi-faceted and discuss subjects as varied as migrant farmworkers' labour (e.g., hours of work, housing) and psycho-social conditions, their access to basic social services, migrant farmworkers' exposure to various chemicals and its health consequences, ergonomic risks and occupational injuries, problems related to immigration laws and their enforcement, migration policies (models and best practices) in different countries, and the social, economic, and cultural influences of migration on the work environment in agriculture. Further, the studies were carried out by different methods –descriptive, qualitative, quantitative and mixed methods. Although studies on this topic are diverse, they mainly cover migration issues of the established countries of immigration (United States and Canada), where migration has become an inalienable part of the academic and policy debates. Since we have conducted a literature search only in English (possible limitation of our study), we found limited data concerning labour and health conditions of migrant farmworkers in Europe. Key European academic journals covering rural and agricultural workers, such as *Journal of Rural Studies, Sociologia Ruralis* and *Journal of Agromedicine* have not given sufficient attention to the labour and health conditions of migrant farmworkers. Such a lack of research in Europe, particularly in a Scandinavian context, pinpoints the need for further research that addresses the work and health conditions of migrant workers in agriculture.

As our results indicate, most of the literature reviewed did not make a clear distinction between greenhouse and outdoor growing (open farms) when describing labour, wage and health conditions of migrant workers. Rather, the use of terms and concepts was unspecific. For instance, several studies employ the term 'horticulture' to denote the cultivation of vegetables, fruits and nuts, as well as greenhouse and nursery crops. Further, most studies use different terms for migrant workers labouring in agriculture, such as greenhouse workers, agricultural workers, pesticide applicators, and farm workers; however, some of these terms do designate specific occupations (e.g., pesticide applicators) . In our study, for the sake of simplicity, we use the terms 'migrant farmworker' and 'migrant agricultural worker' interchangeably to denote migrant workers involved in any manual labour either in greenhouses or on open farms. In Tables 1-12, we have categorized each piece of literature according to its content.

Occupational injuries and illnesses associated with migrant work in agriculture

Our literature review has identified 43 studies that examined the occupational injuries and illnesses among migrant farmworkers. The characteristics of these studies are summarized in Table 1. Studies show that agriculture continues to be the most hazardous sector among all industries, in which migrant farmworkers face a much greater risk of workplace injuries, illnesses and death than domestic workers and workers in every industry except construction (13, 20, 23, 30, 33, 31, 42). Although no systematic data exists in relation to immigrant fatalities in agriculture, one study found that acute traumatic injuries and death are among the most significant occupational hazards in agriculture and accidents involving tractors are the largest source of fatal traumatic injury (31).

Several studies have demonstrated a high incidence of eye injuries and other eye complaints among migrant farmworkers (10, 14, 17, 19, 41). Fatal and non-fatal injury rates, plus a wide range of occupational illnesses, including disorders of multiple organ systems, have been ranked highest among migrant agricultural workers in the United States (24, 27). The data from European countries seem to confirm the findings from the United States. A review of European studies of occupational injuries based on data from the 1980s found that rates of occupational accidents were higher for immigrants than for natives in the Netherlands, Germany, Switzerland, and France (12).

Common explanations for the causes of increased occupational fatalities among migrant farmworkers include the assignment of more hazardous tasks to migrant farmworkers, failure of employers to invest in safety training and equipment, greater risk-taking by migrant farmworkers, and failure to complain about unsafe conditions by workers who may have a precarious job status (8, 30, 34, 47). Since migrant farmworkers have little training in accident prevention, and work full days under hazardous and stressful conditions, they are more prone to accidents such as crushing from farm equipment, accidental slicing with hand labour tools, and falling from ladders (30). Therefore, falls, cuts, amputations, and other injuries are common risks that migrant farmworkers face in their daily work (11, 34, 37, 48, 50). Further, transportation to and from places often occurs in unsafe or overcrowded vehicles. Other studies demonstrated that occupational injuries and illnesses may emanate from poor work and nutrition, substandard housing conditions, language and cultural barriers, poor access to medical services, acute pesticide exposures and inaccurate use of equipment (35, 18, 28).

Other health problems, including dehydration and heart complaints linked to high temperatures among workers in greenhouses, are also common (15, 39, 40). Also, migrant work in the agricultural sector includes constant exposure to respiratory irritants, such as dust, plant pollen, moulds and pesticides, and may cause respiratory difficulties due to poor ventilation in greenhouse/nursery operations, which might result in chronic respiratory illnesses, including allergies, bronchitis, and asthma (21, 49). Further, a high incidence of occupational skin disease is well-documented (8,29). Many studies of farmworkers or greenhouse workers have found evidence of job-related deficits in neuro-behavioural performance or increases in neurologic symptoms, maybe associated with the use of pesticides (9, 16, 22, 25, 26, 32, 36, 38, 39, 44, 45, 46).

Table 1. Characteristics of the studies related to illnesses and occupational injuries associated with migrant work in agriculture

Author	Country of study	Type of publication/study
Ahonen, Benavides and Benach 2007 (7)	Global	Journal article, information analysis
Arcury, Quandt and Mellen 2003 (8)	United States, North Carolina	Journal article, quantitative
Bazylewicz-Walczak, Majczakowa and Szymczak 1999 (9)	Poland	Journal article, clinical trial
Blake 1969 (10)	United States	Journal article, review
BLC 2000 (11)	United States	Report, information analyses
Bollini and Siem 1995 (12)	European Union	Journal article, review
Cabrera and Leckie 2009 (13)	United States, California	Journal article, qualitative
Cameron et al. 2006 (14)	United States, Florida and Illinois	Journal article, cross-sectional survey and interviews conducted in two migrant farm worker communities
Carballo, Divino and Zeric 1998 (15)	European Union	Journal article, information analysis,

		review
Ciesielski et al. 1994 (16)	United States, North Carolina	Journal article, a clinic-based study
Das et al. 2001 (17)	United States, California	Journal article, review
Earle-Richardson et al. 2003 (18)	United States, New York and Pennsylvania	Journal article, cases report
Forst et al. 2004 (19)	United States, Michigan and Illinois	Journal article, two questionnaires, one before safety promotion and one after. Quantitative
Frank et al. 2004 (20)	United States	Journal article, review
Garcia, Dresser and Zerr 1996 (21)	United States, Indiana	Journal article, quantitative
Gomes, Lloyd and Revitt 1999 (22)	Developing countries	Journal article, quantitative
Hansen and Donohoe 2003 (23)	United States	Journal article, review
Hard, Myers and Gerberich 2002 (24)	United States	Journal article, review
Kamel et al. 2007 (25)	United States, Iowa and North Carolina	Journal article, questionnaires, quantitative
Kamel et al. 2003 (26)	United States, Florida	Journal article, cross-sectional study of population, interviews
Kirkhorn and Schenker 2002 (27)	United States	Journal article, Information analyses
Kowalski, Hoffman and Mcclure 1999 (28)	United States, Northwestern Michigan	Journal article, quantitative
Krejci-Manwaring et al. 2006 (29)	United States, North Carolina	Journal article, quantitative, diagnosis
Larson 2001a (30)	United States	Report, information analyses
May and Kullman 2002 (31)	United States	Journal article, review
McConnell, Keifer and Rosenstock 1994 (32)	Nicaragua	Journal article, quantitative
McCurdy et al. 2002 (33)	United States, California	Journal article, quantitative intervention
McDermott and Lee 1990 (34)	United States, South Carolina	Journal article, mixed method
Moses et al. 1993 (35)	United States, San Francisco, CA	Journal article, review
Muniz et al. 2008 (36)	United States, Oregon	Journal article, qualitative intervention
Myers 1997 (37)	United States	Report, mail survey-based surveillance system
Mysyk, England and Gallegos 2008 (38)	Canada, Ontario	Journal article, interviews, qualitative
Parrón et al. 1996a (39)	Spain, Almería	Journal article, quantitative, clinical examinations
Parrón et al. 1996b (40)	Spain, Almería	Journal article, quantitative
Quandt et al. 2001 (41)	United States	Journal article, intervention
Robinson 1989 (42)	United States, California	Journal article, review
Rohlman et al. 2001 (43)	United States, Oregon	Journal article, quantitative
Rohlman, Anger and Lein 2011 (44)	United States	Journal article, review, informational analysis
Rosenstock et al. 1991 (45)	Nicaragua	Journal article, quantitative
Salvatore et al. 2008 (46)	United States, California	Journal article, interviews, urine analysis
Schenker 2010 (47)	Global	Journal article, review
Schenker, Lopez and Wintermute 1995 (48)	United States, California	Journal article, quantitative
Schenker, Ferguson and Gamsky 1991 (49)	United States, California	Journal article, quantitative
Stueland et al. 1995 (50)	United States, Wisconsin	Journal article, information analysis, surveillance of a population, quantitative

The use of chemicals and their effect on migrant health

As our literature review suggests, there is extensive literature focusing on the impact of agricultural chemicals on migrant health (17, 30, 33, 40, 43, 44, 51-82). Studies show that farmworkers are exposed to pesticides during mixing, loading, transporting or application of the chemicals and also when handling materials treated with pesticides (58). Further, exposure may occur from accidental spills, leakage, or faulty equipment. The routes of exposure in unprotected farm workers are mainly through skin and inhalation, but may also occur by ingestion or in some instances by ocular exposure (51, 56, 58). Children of migrant farmworkers may also be exposed, since their parents can bring chemicals into the home on their work clothes (33, 55, 70). Handling of pesticides is often cited as a main exposure category in the occupational medical literature (64). Therefore, the major scientific focus in the literature reviewed tends to revolve around the impact of pesticide exposure on migrant farmworkers' health, in particular concerning acute effects (51-82).

In general, studies indicate that at least three million cases of pesticide poisoning occur each year and result in over 200,000 deaths throughout the world (59). In the United States, for instance, between 10,000 and 20,000 pesticide-related illnesses are reported every year; however, in light of obvious underreporting and misdiagnoses, the United States Environmental Protection Agency (USEPA) estimates the number to be over 300,000 cases of pesticide poisoning every year (69).

Reflecting this global trend, the results of our literature review indicate that the exposure to pesticides among farmworkers, including migrants, and its implications for health issues, is probably the most researched area within agricultural occupational health (52, 53, 57, 74, 79, 80, 81).

Literature from both high and low income countries demonstrates that working in agriculture can also bring about detrimental long-term effects on health, particularly those resulting from exposure to pesticides (17, 54, 60, 61, 65, 77). In Spain, pesticide exposure has been linked to depression, neurological disorders and miscarriages in migrant agricultural workers (39). Some pesticides have a carcinogenic nature, and a high incidence of cancer among migrant farmworkers has been linked to their constant exposure to cancer-causing chemicals (66). Several studies suggest a high prevalence of breast cancer, brain tumours, non-Hodgkin's lymphoma, leukaemia, and prostate cancer among these groups (30, 51, 60, 75, 76, 78).

Our literature review shows that little research has been done on the interaction of one pesticide on another, or on the adherents used within the pesticide formulation. Despite the existence of a significant body of literature regarding the health effects of chemical exposure to migrant farmworkers, our results indicate that much of the research on pesticides used in agriculture tends to focus on a single chemical (51-82). Organophosphates are one of the most commonly described chemicals in scholarly literature (9,32, 44, 45, 58, 73, 108, 110). For example, the use of organophosphates is common in Almeria province (south-eastern Spain), a region that has the highest density of greenhouses in the world (40). Studies claim that assessment of the exposure to a single pesticide does not capture the complexity of the occupational exposure, since usually a mixture of pesticides and other ingredients in the formula are applied (51, 62,71, 72, 73). Consequently, these studies suggest that it is nearly impossible to identify to which specific pesticide the migrant farmworkers were exposed, due to their constant mobility within different farms throughout many years.

Table 2. Characteristics of the studies regarding the effects of chemicals on migrant farmworkers' health

Author	Country of study	Type of publication/study
Cabrera 1991 (51)	United States	Journal article, information analysis
Das et al. 2001 (17)	United States, California	Journal article, review
Dullinger 1987 (52)	Global	Journal article, information analysis
Eckerman et al. 2009 (53)	Brazil, Goiás	Journal article, observations and interviews
Figa-Talamanca et al. 1993 (54)	Italy, province of Rome	Journal article, review and statistical analysis
Goldman et al. 2004 (55)	United States, California	Journal article, interviews, data analysis
Gomes et al. 1997 (56)	United Arab Emirates	Journal article, questionnaires, quantitative, blood samples
Jacobs and Dinham 2003 (57)	Global	Book
Jaga and Dharmani 2003 (58)	United States	Journal article, information analysis
Lee et al. 2003 (59)	South Africa, Western Cape	Journal article, cross-sectional survey, blood samples
Larson 2001a (30)	United States	Report, information analysis
McCurdy et al. 2002 (33)	United States, California	Journal article, quantitative intervention
Mills, Dodge and Yang 2009 (60)	United States, California	Journal article, case-control studies, information analysis
Mills and Yang 2003 (61)	United States, California	Journal article, review
Moses 1989 (62)	United States	Journal article, review
Nasterlack 2006 (63)	Global	Journal article, review
Nasterlack and Zober 2006 (64)	Global	Journal article, information analysis
O'Malley 1997 (65)	United States	Journal article, review
Parrón et al. 1996a (39)	Spain, Almería	Journal article, quantitative, clinical examinations
Purschwitz and Field 1990 (66)	Global	Journal article, review
Rohlman et al. 2005 (67)	United States, North Carolina & Oregon	Journal article, questionnaire, neuro-behavioral tests on children
Rohlman et al. 2007 (68)	United States	Journal article, neurobehavioral test,

		interviews, quantitative
Rohlman et al. 2001 (43)	United States, Oregon	Journal article, quantitative
Rohlman, Anger and Lein 2011 (44)	United States	Journal article, literature review and information analysis
Salazar et al. 2004 (69)	United States	Journal article, group interviews, quantitative
Schenker, Lopez and Wintermute 1995 (70)	United States, California	Journal article, review
Schilmann et al. 2010 (71)	Mexico, Morelos	Journal article, questionnaires, interviews
Shaver and Tong 1991 (72)	United States	Journal article, review
Simcox et al. 1999 (73)	United States, Central Washington	Journal article, quantitative intervention, urine samples
Strigini 1982 (74)	United States	Journal article, review
Thompson et al. 2003 (75)	United States	Journal article, intervention
Van Maele-Fabry and Willems 2004 (76)	Belgium, Ghent	Journal article, review
Varona et al. 2003 (77)	Colombia, Bogota	Journal article, review
Vaughan 1993 (78)	United States	Journal article, review
Villarejo and Baron 1999 (79)	United States	Journal article, review
Von Essen and McCurdy 1998 (80)	United States	Journal article, review
Wilk 1986 (81)	United States	Book, information analysis
Zahm and Blair 1993 (82)	United States	Journal article, epidemiologic review

Ergonomic conditions and musculoskeletal injuries

Twelve studies (7, 14, 30, 83-91) examined the ergonomic conditions and musculoskeletal injuries among migrant farmworkers. Our results show that migrant agricultural workers often experience severe ergonomic conditions in their working life (7, 83, 84, 85). The heavy lifting, awkward body posturing, twisting and repetitive tasks of agricultural work lend themselves to the development of musculoskeletal injuries that can present acute problems and long-term disabilities in migrant farmworkers (89).

Most studies reveal a high level of back-ache and other chronic conditions that cause these workers to suffer from lost working days, constant pain and difficulty moving (14, 83, 86, 87, 88, 90, 91). Contributing factors include poorly designed tools, lack of training, and long working hours. Back and neck pain are some of the most common types of chronic pain migrant farmworkers experience (30). In California, both male and female farmworkers have been reported to have a high prevalence of chronic pain (91).

Table 3. Characteristics of the studies regarding the ergonomic conditions and musculoskeletal injuries in migrant farmwork

Author	**Country of study**	**Type of publication/study**
Ahonen et al. 2007 (7)	Global	Journal article, information analysis
Cameron et al. 2006 (14)	United States, Florida and Illinois	Journal article, cross-sectional survey and interviews conducted in two migrant farm worker communities
Davis and Kotowski 2007 (83)	United States	Journal article, information analysis
Earle-Richardson et al. 2008 (84)	United States, New York	Journal article, biological tests on muscles, statistical analysis, qualitative
Earle-Richardson 2006 (85)	United States, New York	Journal article, comparison of muscle exertion, statistical analysis, qualitative
Estill and Tanaka 1998 (86)	United States	Journal article, review
Larson 2001a (30)	United States	Report, information analysis
Mines, Mullenax and Saca 2001 (87)	Mexico, United States	Report, information analysis
Palmer 1996 (88)	United Kingdom	Journal article, questionnaires, statistical analysis
Quandt et al. 2010 (89)	United States, North Carolina	Journal article, interviews, urine samples
Strong and Maralani 1998 (90)	United States	Journal article, in-person survey
Villarejo et al. 2000 (91)	United States, California	Report, information analyses

Impact of working hours

In our review, we have found ten studies (11, 24, 27, 37, 66, 92-96) that looked at the impact of working hours on the health conditions of the migrant agricultural workers. The results of these studies show that injuries and illnesses among migrant farmworkers increase as the number of hours

worked per week increase. Greenhouses have been reported as one of the most hazardous workplaces in agriculture. Several studies have shown that working conditions in greenhouses pose significant health hazards for migrant farmworkers, mainly due to high humidity, temperature and poor ventilation (15, 39, 93). Data from southern Spain indicate that the type of greenhouse structure for crops, which is typical in southern Spain, does not guarantee worker comfort. Therefore, a reduction in work shifts to a maximum of 4 hours is advised to make this activity healthier. The remaining 4 hours of the work shift should be completed in other similar activities (92).

Studies indicate that the work-related health and safety risks all agricultural workers face may be greater for migrant workers, because they work longer hours, and often do not report illnesses/injuries to avoid deportation or losing pay (94, 95). On the other hand, data from North Carolina show that most traumas affecting migrant farm workers are not directly occupational and happen in conjunction with recreational activity, where alcohol is an important risk factor (96). Nevertheless, most of the studies tend to associate occupational injuries and illnesses with long working hours (11, 24, 27, 37, 66, 92-95).

Table 4. Characteristics of the studies regarding the impact of working hours on migrant health

Author	Country of study	Type of publication/study
BLC 2000 (11)	United States	Report, information analyses
Callejón-Ferre et al. 2009 (92)	Almería, Spain	Journal article, interviews, quantitative
Hard, Myers and Gerberich 2002 (24)	United States	Journal article, information analyses
Henke and Jurewicz 2004 (93)	Poland	Journal article, interviews, quantitative
Kirkhorn and Schenker 2002 (27)	United States	Journal article, Information analyses
May 2009 (94)	United States	Book chapter, review
Myers 1997 (37)	United States, Ohio	Report, information analysis
Preibisch 2005 (95)	Canada	Article, information analysis
Purschwitz and Field 1990 (66)	Global	Journal article, review
Steinhorst et al. 2007 (96)	United States, North Carolina	Journal article, information and statistical analysis

Psychosocial conditions of migrant agricultural workers

Twenty five studies (9, 51, 97-118) focused on psychosocial conditions of migrant agricultural workers. Social isolation and language and cultural barriers were problems that echoed in some manner in all of the studies. These studies show social isolation and cultural persistence to be part of the conditions migrant farmworkers experience in host countries, often being insulated from the rest of the community due to language and cultural barriers. Also, migrant workers' fear of job loss or being blacklisted for speaking up keeps them silent.

Studies conducted in Canada indicate that Mexican migrant farmworkers are not socially and culturally integrated into Canadian society, although they make a significant contribution to the local economy (97, 98, 99, 117). For example, one study empirically demonstrated that residents of Exeter, Ontario, are aware of the existence of migrant farmworkers in the community, but rarely form any type of relationship with these workers; rather, community members engage in the processes of stereotyping and racialization (114). Several studies describe a similar situation in California, United States, where migrant farmworkers are absent from the popular imagination of the rural landscape (111, 112, 113). As a policy remedy, one study suggests that programmes in relation to migrant farmworkers should be designed to educate and engage the residents of host communities about the presence and the plight of migrant workers. This should be combined with other efforts to integrate them.

Several studies found that migrant farmworkers do not report their pesticide-related illnesses to health centres due to fear of retaliation, as their employers may be discouraging them from using health care facilities (113, 116). Data from the United States show that migrant farmworkers in the southern states often face daily structural and symbolic violence, which can lead to excessive use of drugs and alcohol (101). Farmers often resell consumable commodities, such as food, alcohol, and

cigarettes, to migrant farmworkers, which brings about a way of controlling and managing workers in situations of demanding and risky work (100). Similar patterns have been found in Canada and the United Kingdom (104, 108). Mexican male seasonal farm workers in Ontario manifest cultural expressions of 'nervios' that are influenced, in part, by international capital-driven agribusiness over which they have little control (104). Expressions of 'nervios' are variously described as idioms of distress, embodied metaphors of distress, even acts of resistance to unacceptable working and/or living conditions (102). One study found that Romanian and Bulgarian students working in the United Kingdom are deeply frustrated about their exploitation in terms of wages, living conditions, and the fact that they have come to the United Kingdom on false promises of cultural exchange and learning (108).

Problem drinking resulting from psychological distress and social isolation has been stated in several studies as one of the most common problems among migrant farmworkers in the United States (100, 101, 103, 105). One study suggests that policies and programmes that endorse the migration of families and promote social inclusion might be an effective means of tackling the problem (105).

An empirical study of Latino farmworkers in North Carolina, United States, shows that family ambivalence is common among migrant farmworkers (107). The family ambivalence is associated with anxiety symptoms, especially among men who are unable to contact their families regularly. Therefore, the study recommends family contact to be facilitated by expanding access to telephones among migrant farmworkers, which may contribute to improvement of migrant mental health.

Studies also linked migrant farmworkers' psychosocial conditions to the level of pesticide exposure they experience in their daily work (9, 39, 51, 109, 110, 111, 114, 118). They suggest that migrant farmworkers with exposure to agricultural pesticides may be at increased risk of depression, and depression is a major risk factor for suicide.

Table 5. Characteristics of the studies regarding the psychosocial conditions of migrant farmworkers

Author	Country of study	Type of publication/study
Basok 2002 (97)	Canada	Book
Basok 2003a (98)	Canada	Working paper, information analysis
Bauder 2008 (99)	Canada, Ontario	Journal article, information analysis
Bazylewicz-Walczak et al. 1999 (9)	Poland	Journal article, clinical trial
Bletzer 2004 (100)	United States	Journal article, review
Bletzer and Weatherby 2009 (101)	United States, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas	Journal article, analysis of two previous studies, qualitative (multi-site ethnography)
Cabrera 1991 (51)	United States	Journal article, information analysis
Davis and Low 1989 (102)	United States	Book
Duke and Carpinteiro 2009 (103)	United States and Mexico	Journal article, semi-structured interviews and participant observation
England et al. 2007 (104)	Canada, Ontario	Journal article, descriptive and focused interview
Garcia 2004 (105)	United States	Journal article, review
Griffin and Soskolne 2003 (106)	Israel	Journal article, cross-sectional study, questionnaires, quantitative
Grzywacz et.al 2006 (107)	United States, North Carolina	Journal article, site-based sampling method and interviews, quantitative
Ivancheva 2007 (108)	United Kingdom	Journal article, qualitative
Jaga and Dharmani 2007 (109)	Global	Journal article, review
London et al. 2005 (110)	Global	Journal article, review
Magaña and Hovey 2003 (111)	United States, northwest Ohio & southern Michigan	Journal article, interviews, qualitative, questionnaires
Mitchell 1996 (112)	United States, California	Book
Mobed et al. 1992 (113)	United States	Journal article, information analysis
Parrón et al. 1996a (39)	Spain, Almería	Journal article, quantitative, clinical examinations
Reid 2004 (114)	Canada, Ontario	Published paper, structured telephone interviews of a random sample

Reidy et al. 1992 (115)	United States	Journal article, clinical trial
Schnitzer and Shannon 1999 (116)	United States	Journal article, information analysis and research evaluation
Smart 1997 (117)	Canada, Alberta	Journal article, review
Stallones and Beseler 2002 (118)	United States	Journal article, cross-sectional survey and personal interviews

Housing

We have identified fourteen studies that discussed the housing conditions of migrant agricultural workers (39, 119-130). These studies show that migrant farmworkers often live in substandard, overcrowded and unsafe housing that lacks adequate sanitation and protection from various infectious elements. In his study of housing conditions of migrant farmworkers in the United States, Larson (125) found that housing problems range from broken windows, lack of working shower and laundry facilities and broken toilets, to serious structural deficiencies, such as sagging roofs, porches or house frames, and each may contribute to concerns about poor health and safety . In this regard, studies show that poor housing conditions are one of the major factors that affect migrant farmworkers' health, leading to dissemination of various infectious skin diseases, respiratory diseases, infectious diseases and injuries (39, 121, 123, 125, 128, 129, 130).

Table 6. Characteristics of the studies regarding the housing conditions of migrant farmworkers

Author	**Country of study**	**Type of publication/study**
Arcury and Quandt 2007 (119)	United States	Journal article, review
Bethel and Schenker 2005 (120)	United States	Journal article, review
Bradman et al. 2005 (121)	United States, California	Journal article, quantitative
Gentry et al. 2007 (122)	United States, North Carolina	Journal article, qualitative (interviews)
Holden 2001 (123)	United States	Report, review
Kasirye et al. 2005 (124)	United States, California	Journal article, clinical trial
Larson 2001a (30)	United States	Report, review
Larson 2001b (125)	United States	Report, review
Larson 1995 (126)	United States, Washington	Report, review
Martin 2006 (127)	Global	Conference paper, review
Parrón et al. 1996a (39)	Spain, Almería	Journal article, quantitative, clinical examinations
Rye and Andrzejewska 2010 (128)	Norway	Journal article, review and qualitative in-depth interviews
Sherman et al. 1997 (129)	United States, California	Book, surveys and information analysis
Vallejos et al. 2011 (130)	United States, North Carolina	Journal article, guided questionnaires, quantitative

Deficiencies in basic services, such as medical care

Accessing basic social services, such as medical care, was a problem that echoed in some manner in most of the literature we have reviewed (81, 94, 97, 98, 113, 128, 131-137). Much of this literature shows that migrant farmworkers often have impaired access to health care and social benefits. The reasons for the impaired access to health care among migrants can be financial – the cost of the care and the time lost from work; social – some workers may not accept medicine and may opt for home remedies or seek treatment from healers within their community; and legal – those who have illegal worker status might have a powerful incentive to avoid interactions with the medical establishment.

Data from Canada shows that language and cultural differences are one of the key factors that explain migrants' impaired access to social services. Studies found that Mexican migrant farmworkers in Canada often find it extremely difficult to use health care facilities and the social security system due to language and cultural barriers (131, 135). Similar patterns have been reported in the United States, where clinicians possessed limited knowledge about diagnosis and treatment of pesticide-related illnesses in migrant farmworkers due to language and cultural differences (81, 94, 113, 134).

Table 7. Characteristics of the studies regarding migrant farmworkers' access to basic services

Author	Country of study	Type of publication/study
Basok 2002 (97)	Canada	Book, information analysis
Basok 2003a (98)	Canada	Working paper, information analysis
Basok 2003b (131)	Canada	Journal article, review
Gordon 2011 (132)	Europe	Published paper, interviews, information analysis
Maclaren and Lapointe 2009 (133)	Canada	Report, information analysis
May 2009 (94)	United States	Book chapter, review
Meggs and Langley 1997 (134)	United States	Book chapter, information analysis
Mobed et al. 1992 (113)	United States	Journal article, information analysis
Mysyk et al. 2009 (135)	Canada, Ontario	Journal article, pilot study
Rye and Andrzejewska 2010 (128)	Norway	Journal article, review and qualitative in-depth interviews
Seth 2011 (136)	United States	Journal article, information and statistics analysis
Vosko 2006 (137)	Canada	Book
Wilk 1988 (81)	United States	Report, information analysis

Undocumented migrants

Most countries welcome the entry of highly skilled migrant workers into their labour market, while low and semi-skilled migrants often face enormous constraints in their mobility, despite employer demand, resulting in increased illegal migration, often organized by labour-recruiters and people-traffickers (155). Hence, the existence of tens of millions of undocumented migrants around the world reveals that states often fail to control the entry of foreigners into their territory. Agriculture continues to be a sector that provides employment for undocumented migrants more easily and extensively than other sectors, because it is more difficult to inspect and regulate than other sectors. Reflecting this trend, our literature review indicates that research into undocumented migrant agricultural workers is much more limited and mainly of a theoretical nature. We have identified nineteen studies that examined the migrant workers labouring in agriculture (127, 139-156). Studies mainly focus on the United States (140, 143-145, 149, 154), Spain (146, 148, 151), Italy (152, 153), Canada (139), and Germany (147).

Hess's (147) study indicates that the informal labour market remains important in Germany, although policy during the eight year survey period has successfully reduced activity within this sector – seasonal farm labour migration from Central and Eastern European countries for German agriculture. Hartman's (146) study describes a similar tendency in Spain, where Romanian migrants work informally, and often temporarily, in an agricultural area characterized by intensive plastic greenhouse production in Almeria province. Similar patterns are also observed in Italy, where the informal economy provides irregular employment in the absence of a permit to stay, though it is low-paid (153).

One study conducted in southern Spain shows that the increase in undocumented migrants caused negative and xenophobic attitudes towards migrant farmworkers (151). This study found that negative attitudes towards migrant farmworkers in southern Spain were mainly incited by local and state policies governing migration, labour and national security. In this regard, a Canadian study claims that whether or not migrant workers return home or stay paperless in the host country depends to a large extent on how the migrant worker programme is administered (139). By comparing the United States' Bracero Programme with the Canadian Seasonal Agricultural Workers Programme (SAWP), Basok (139) demonstrated that three aspects of programme administration account for why so many migrant workers stayed in the United States illegally, while almost all temporary migrant workers employed in Canada return to Mexico at the end of the season. The three aspects are recruitment policies and procedures, enforcement of employment and housing-related minimum standards, and the size of the programme. Another contributing factor that Basok mentions is the existence of social networks, which play an important role as to whether guest workers return home or stay in the host country. Basok's (139) study shows that migrant workers in the United States were able to stay illegally in the country because of the existence of Mexicans or

Chicanos and economic infrastructure, whereas migrant workers were not able to stay illegally in Canada, due to the unavailability of such networks or infrastructure.

In addition, other studies described structural, legal and political factors that could reduce the number of undocumented migrants. According to Weil (156), programmes that provide structured and predictable access over time to migration and work opportunities are more likely to reduce pressures from undocumented migration and to achieve the much vaunted "triple win" or goal of co-development. The essence of the triple win is that a single policy of temporary migration could meet the interests of three parties – the receiving state (by filling labour market gaps), the sending state (by ensuring a flow of remittances and employment opportunities for un- or underemployed workers), and the migrants themselves (by providing opportunities for skills acquisition, work experience and an income that enables personal, family or village-level savings).

Table 8. Characteristics of the studies regarding undocumented migrant workers

Author	Country of study	Type of publication/study
Basok 2000 (139)	United States and Canada	Review, information analysis
Borjas et al. 1991 (140)	United States	Book chapter, information analysis
Bosniak 1991 (141)	Global	Review, information analysis
Castles 2004 (142)	Global	Journal article, review
Chiswick 1984 (143)	United States	Journal article, information analysis
Chiswick 1986 (144)	United States	Journal article, information analysis
Chiswick 1991 (145)	United States	Journal article, information analysis
Hartman 2008 (146)	Spain, Almería	Journal article, review
Hess 2006 (147)	Germany	Journal article, information analysis, statistics analysis
Markova 2006 (148)	Spain, Madrid	Working paper, information analysis, statistics analysis
Martin 2006 (127)	Global	Conference paper, review
Massey et al. 1987 (149)	United States	Book
Ramasamy et al. 2008 (150)	Global	Journal article, information analysis
Repič 2010 (151)	Spain	Journal article, statistics analysis
Reyneri 2003 (152)	Southern European countries	Journal article, review
Reyneri 1998 (153)	Italy	Journal article, review, information analysis
Rivera-Batiz 1999 (154)	United States	Journal article, cross-sectional and longitudinal analysis
Schindlmayr 2003 (155)	Global	Journal article, review
Weil 2002 (156)	Global	Review, information analysis

Discrimination and precarious working conditions

In our review, we have identified thirty three studies that discussed the discrimination and precarious working conditions of migrant agricultural workers (47, 51, 95, 108, 148, 97-99, 157-179). These studies indicate that the enforcement of regulations governing working life of migrant farmworkers and ill-treatment of migrant farmworkers is a chronic problem. For example, data from Canada shows that migrant agricultural workers are among the least protected in Canada in both federal and provincial legislation, despite the fact that they are potentially exposed to dangerous working conditions and health risks (169). Studies conducted in the United States also describe a similar situation in that migrant farmworkers often do not report their occupational diseases, due to lack of support from large labour unions and fear of losing their jobs (51). Therefore, studies suggest that there is a positive correlation between migrant farmworkers' legal status and occupational injuries and illnesses (47, 51).

Even though the Canadian Seasonal Agricultural Workers Programme (SAWP) has been recognized internationally as one of the best practices to manage migration, studies document a pattern of abuse, disregard, and neglect of migrant farmworkers with respect to their working conditions, salaries, accommodation, and labour mobility (97, 98, 139, 175, 178). As Basok (131) describes, Mexican migrant workers in Ontario do not exercise their legal rights for these reasons: fear of being expelled from the guest worker programme, social exclusion from the community and,

most importantly, language barriers. Under the SAWP, as Tomic *et al.* (178) argue, migrant farmworkers are *de facto* denied the right to choose their own accommodation, the right to leave their employers' premises after work, and the right to move freely within those premises. Tomic *et al.* (178) argues that tying legal status to employers is problematic, since it leaves the migrant workers very vulnerable. Studies suggest that the lack of government regulation and oversight often leads to employers' non-compliance with legislation, and even to abuse and exploitation (158, 159, 160). Therefore, a re-direction of state responsibility toward workers is necessary if workers are going to get better treatment. The impositions of severe penalties on employers who abuse foreign migrant workers are suggested as a key measure to improve the situation.

The seasonal migration of farm labourers from the new accession countries of Central and Eastern Europe to Southern Europe has received considerable scholarly interest. There is a growing body of literature that focuses on the social and labour conditions of migrant workers in Southern Europe (148, 157, 168, 171, 172, 176). As Markova's (148) empirical study demonstrates, migrant workers in Southern Europe work in a highly segmented labour market, with temporary, low-paid, heavy or dangerous work – the jobs that natives refuse to do, especially in construction, heavy industry and agriculture. Ethno-stratification of the labour market is particularly evident in Spain. As Agudelo-Suarez *et al.* (157) show, migrant communities (Romanians, Moroccans, Ecuadorians, Colombians and Sub-Saharan Africans) in Spain often experience discrimination in their community and working life, characterized by experiences of racism, mistreatment and precarious working conditions in comparison to the Spanish-born population. The study also showed that migrant communities face political and legal structural barriers related to social institutions. Experiences of discrimination can affect their mental health and are decisive factors regarding access to health care services. Geiger's (168) empirical study indicates that social inclusion of Moroccan and Romanian migrants in the Spanish society remains an unfulfilled dream, as evidenced by their impaired access to social benefits. Kasimis and Papadopoulos (170) describe similar problems in Greece, where migrant farmworkers face stigma and discrimination despite their significant contribution to the local economy.

Table 9. Characteristics of the studies regarding discrimination and precarious working conditions of migrant farmworkers

Author	Country of study	Type of publication/study
Agudelo-Suarez et al. 2009 (157)	Spain, Madrid, Barcelona, Valencia, Alicante and Huelva	Journal article, interviews, qualitative
Aguiar 2006 (158)	Canada, British Columbia and Ontario	Journal article, review
Aguiar 2004 (159)	Canada, British Columbia	Journal article, review
Aguiar and Trumper 2011(160)	Canada, British Columbia	Review, information analysis
Arcury, Quandt and Russell 2002 (161)	United States, North Carolina	Journal article, interviews, quantitative
Atkinson 1985 (162)	United Kingdom	Report, review
Barnetson 2009 (163)	Canada, Alberta	Journal article, review, information analysis
Basok 2000 (139)	United States and Canada	Review, information analysis
Gordon 2011 (132)	Europe	Published paper, interviews, information analysis
Basok 2003a (98)	Canada	Working paper, information analysis
Basok 2003b (131)	Canada	Journal article, review
Bauder 2008 (99)	Canada, Ontario	Journal article, information analysis
Binford 2004 (164)	Canada	Journal article, review
Butovsky and Murray 2007 (165)	Canada, Ontario	Journal article, review
Cabrera 1991 (51)	United States	Journal article, information analysis
Choudry 2009 (166)	Canada	Book, information analysis
Cohen 1987 (167)	Global	Journal article, review
Geiger 2008 (168)	Spain, Almeria	Book, information analysis
Hanson, Otero and Preibisch 2006 (169)	Canada, British Columbia	Conference paper, information analysis, statistics analysis
Ivancheva 2007 (108)	United Kingdom	Journal article, qualitative
Kasimis and Papadopoulos 2005 (170)	Greece	Journal article, information and statistics analysis

Lyberaki 2008 (171)	Greece	Journal article, review
Markova 2006 (148)	Spain, Madrid	Working paper, information analysis, statistics analysis
Mendis 2007 (172)	Canada, British Columbia	PhD thesis, archival research and interviews
Norris 2009 (173)	United States	Book, information analysis
Preibisch and Binford 2007 (175)	Canada	Journal article, information analysis, statistics analysis
Preibisch 2007 (174)	Canada, Ontario	Journal article, review
Preibisch 2005 (95)	Canada	Journal article, information analysis
Schenker 2010 (47)	Global	Journal article, review
Sole and Parella 2003 (176)	Spain	Journal article, review
Stilz 2010 (177)	Global	Journal article, review
Tomic, Trumper and Aguiar 2010 (178)	Canada, British Columbia	Report, review
Walia 2010 (179)	Canada	Journal article, information analysis

Consequences for the working environment in agriculture in general

We have identified forty one studies that discuss the 'social dumping' effects of migrant work on agriculture (3, 97, 98, 119, 128, 148, 151-153, 168-171, 179-206). As these studies illustrate, the availability of migrant farmworkers as a cheap labour force and their endurance to harsh working conditions have negatively influenced the agricultural sectors of migrant-receiving countries, thereby transforming agriculture into the most hazardous and low-paid sector. Much of this literature argues that the increase of migrant workers can make the agricultural sector isolated from the national labour market, leading to 'social dumping' effects in host countries. In other words, agriculture may not provide workers' health insurance to seasonal migrant workers, making farm work less attractive to domestic workers who are interested in benefits. Another result might be that labour market information flows far more freely from a migrant workplace to migrant countries of origin than to pockets of unemployment nearby, thereby making the agriculture a migrant-only sector.

The most extensive research regarding the 'social dumping' effects of migrant work on agriculture has been carried out in the United States (119, 181, 186-188, 190. 196-198, 202-203, 205). The bulk of this research found that migrant farmworkers labouring in the United States endure conditions of structural violence, including deplorable wages and endemic poverty, forms of stigma and racism, occupational health and safety hazards, poor health and limited access to services, and the constant threat of deportation. Consequently, these studies suggest that the preservation of the status quo might have negative consequences on the working environment in this sector, thereby transforming agriculture into the most hazardous and low-paid sector.

Studies have reported similar structural, legal and social problems in Canada, with migrant workers largely concentrated in the agricultural sector. Hence, the vulnerable position and poor labour conditions of Mexican migrant farmworkers have received considerable scholarly attention in Canada (183, 97, 98, 169, 179, 180). Binford's (183) study showed that temporary agricultural migrant workers in Canada are being constantly segmented along racial/ethnic lines to a large extent, as Canadian farmers prefer Spanish-speaking migrants from Mexico to English-speaking migrants from Caribbean Commonwealth nations, such as Jamaica and Barbados. He suggests that Canadian farmers find it easy to exploit a Mexican labour force, which is particularly vulnerable due to cultural and linguistic differences from Canadian farmers. In the context of the province of British Columbia, Walia (179) demonstrates that migrant workers are maintained in a state of vulnerability under both the SAWP and the Live-in Caregiver (LCP) Programme, available as a pool of cheap labour but excluded from belonging to the nation.

There has been renewed scholarly interest in migration issues in Europe following the 2004 EU enlargement. According to Jentsch (192), most of the migrant workers from new EU Member States often find employment in rural areas, particularly in agriculture. In view of recent migration trends from new EU Member States to Southern and Northern Europe, a growing body of literature discusses migrant farmworkers' underpayment and bad working conditions, and the implication of this new migration trend for rural communities. In their study of working conditions of Eastern European migrant farmworkers in Norwegian agriculture, Rye and Andrzejewska (128) have

examined the 'social dumping' effects of these migrating workers from Eastern Europe, as they are considered prone to exploitation by farmers looking for cheap and docile labour, and subject to low wages and poor labour conditions. Their key argument is that, despite the implementation of labour regulations ('transitional rules') in Norway that set minimum wage levels and labour conditions, many in the westward-migrating labour force experience work conditions that are far poorer than prescribed by the labour regulations, as these are not implemented at farm level. Rye and Andrzejewska present two sets of factors explaining the poorer working conditions on the farms: (1) the structural disempowerment of migrant workers, which gives them weak negotiation positions vis-à-vis their employers (farmers); and (2) migrant workers' frame of reference for wage levels, in which poor payment levels by Norwegian standards are deemed reasonable or even better when judged by Eastern European wage levels.

A similar situation has been described in Binford's (182) study concerning Mexican seasonal migrant farmworkers in Canada. On the one hand, Mexican migrants are structurally disempowered, due to the fact that their legal status in Canada is tied to their employers. On the other hand, contract labour in Canada presents one of the few opportunities for many poor rural Mexicans to acquire the income necessary for a minimum of decent life. Like the Eastern European migrants in Norway, most Mexican migrant farmworkers in Canada do everything possible to please their employers and continue in the programme, even though the work is hazardous and exposure to pesticides is frequent. From this perspective, the structural disempowerment and the social reproduction of migrant workers in their country of origin affect their work performance and attitude towards working conditions in the receiving countries, leading to 'social dumping' effects in the labour market of host countries.

The steady upsurge in the numbers of immigrants in Southern European countries over the last two decades has received a considerable scholarly attention in academic debates and led researchers to formulate a "Southern European model of migration". According to this model, the migration in Southern Europe is characterized by illegality related to strict migration controls imposed by the European Union, heterogeneity of immigrants' nationalities, differentiation of their social and cultural origins, predominance of male over female migrants, and coexistence of immigration, unemployment and underemployment in the countries of reception. In the context of Spain, Palacios *et al.* (199) demonstrate that increases in the labour supply, prompted by continued unauthorized entries and employment, has adversely affected the wages and working conditions in the farming sector, speeding the exit of local workers from agriculture. As a result, immigrant farm workers suffer from labour irregularity, underemployment and social isolation. This reinforces findings of Ubaldo Martínez (204), who found a similar tendency that the real comparative advantage (relative to native workers) of all immigrant groups lies in their desperation. In his empirical study of labour and social conditions of Bulgarian migrant workers in Spain, Markova (148) concluded that Bulgarian migrant workers face discrimination and exploitation due to their paperless status. The results of these studies lead to the proposition that it is this propensity of migrant farmworkers for self-exploitation that paradoxically guarantees their employability and very survival in the Spanish labour market.

In southern Spain, as Repič (151) described, migrant workers are often at the very bottom of the social scale, and it is in the interest of the large multinational companies and employers (individual farmers who hire migrant workers) to continue the policy of exclusion and foster their non-integration. Evidence from Girona, Spain, suggests that the majority of African migrant workers do unskilled work, at poor pay, in occupations associated with inferior social status, with short periods of employment. Hoggart and Mendoza's results are comparable to Calavita's (184) study investigating the relationship between migrants' economic function and their ability to integrate into the host society in Italy and Spain. Calavita argues that the migrants' legal and economic marginality is seen as their chief virtue. In their analysis of immigration into Greek agriculture, Kasimis *et al.* (194) also demonstrate that migrant workers are usually employed to do the hardest and the most unhealthy jobs, while at the same time receiving poor wages and experiencing long working days.

Table 10. Characteristics of the studies regarding the consequences of rising migration for the working environment in agriculture

Author	Country of study	Type of publication/study
Arcury and Quandt 2007 (119)	United States	Journal article, review
Basok 2002 (97)	Canada	Book, information analysis
Basok 2009 (180)	United States and Canada	Journal article, information analysis
Basok 2003a (98)	Canada	Working paper, information analysis
Benson 2008 (181)	United States	Journal article, information analysis
Binford 2009 (182)	Canada	Journal article, information analysis
Binford 2002 (183)	Mexico	Journal article, statistics analysis, interviews, quantitative
Calavita 2003 (184)	United States, Italy and Spain	Journal article, information and statistics analysis
CRC 2007 (185)	United Kingdom	Briefing paper, information analysis
Emerson 2007 (186)	United States	Journal article, information analysis
Friedland and Nelkin 1971 (187)	United States	Book, information analysis
Geiger 2008 (168)	Spain, Almeria	Book, information analysis
Goldfarb 1981 (188)	United States	Book, information analysis
Gowricharn 2002 (189)	Netherlands	Journal article, review
Griffith and Kissam 1994 (190)	United States	Book, information analysis
Hanson, Otero and Preibisch 2006 (169)	Canada, British Columbia	Conference paper, information analysis, statistics analysis
Hoggart and Mendoza 1999 (191)	Spain	Journal article, statistics analysis
IOM 2008 (3)	Global	Report, review
Jentsch 2007 (192)	Europe	Journal article, information analysis
Jentsch, De Lima and MacDonald 2007 (193)	Scotland	Journal article, review
Kasimis and Papadopoulos 2005 (170)	Greece	Journal article, information and statistics analysis
Kasimis, Papadopoulos and Zacopoulou 2003 (194)	Greece	Journal article, review
King 2000 (195)	Southern Europe	Journal article, review
Lyberaki 2008 (171)	Greece	Journal article, review
Markova 2006 (148)	Spain, Madrid	Working paper, information analysis, statistics analysis
Massey and Liang 1989 (196)	United States	Journal article, information analysis, statistics analysis
Mize 2006 (197)	United States	Journal article, information analysis, interviews, qualitative
Oxfam America 2004 (198)	United States	Report, review
Palacios et al. 2009 (199)	United States and Spain	Journal article, review and statistics analysis
Rogaly 2008a (200)	United Kingdom	Journal article, review
Rogaly 2008b (201)	United Kingdom and India	Journal article, case studies, information analysis
Repič 2010 (151)	Spain	Journal article, statistics analysis
Reyneri 2003 (152)	South European countries	Journal article, review
Reyneri 1998 (153)	Italy	Journal article, review, information analysis
Rye and Andrzejewska 2010 (128)	Norway	Journal article, review and qualitative in-depth interviews
Smith-Nonini 1999 (202)	United States, North Carolina	Report, review
Thompson and Wiggins 2002 (203)	United States	Book, information analysis
Ubaldo Martínez 1998 (204)	Spain	Journal article, review
Villarejo 2003 (205)	United States	Journal article, review
Walia 2010 (179)	Canada	Journal article, information analysis
Wells 1996 (206)	United States, California	Book, qualitative

Models for addressing the problem and their consequences

Despite the existence of a significant body of literature on migrant health issues, studies highlight that there is a lack of accurate data on the health and safety situations of migrant farmworkers. In this regard, most of the research on migrant health issues is concerned with the North American context (United States and Canada), while few studies have been conducted regarding occupational health issues of migrant farmworkers in Europe during the past decade, despite the drastic increase of migration flows following the 2005 EU enlargement. The findings of Schenker (47) and Ahonen *et*

al. (7) demonstrate that few studies have critically assessed the occupational health risks among migrant farmworkers. In their systematic literature review, Ahonen *et al.* (7) found only 48 articles in English or Spanish on immigrant occupational health between 1990 and 2005. This is consistent with Muniz *et al* (36), who claim that migrant farmworkers still continue to be underresearched group, due to methodological, language and education barriers. Nevertheless, published studies and various reports indicate a consistent pattern of higher occupational morbidity and mortality among migrant farmworkers.

Our literature review indicates that much of the research into models for addressing migrant farmworkers' health and safety issues comes from the United States (207, 216, 218, 219 222, 226, 232). In the United States, the Environmental Protection Agency (USEPA) and Occupational Safety and Health Administration regulate pesticide production and application, and both agencies require that agricultural workers be given pesticide related training and information (30). In accordance with the USEPA Worker Protection Standard, growers (employers) are required to provide adequate, comprehensive training to their farmworkers regarding the health risks of pesticide exposure and proper pesticide use. Despite the existence of USEPA regulations and models covering all aspects of protection and education, studies claim that laws regarding pesticide safety training are not adequately enforced, as workers do not receive the required training or are subject to ineffective educational techniques.

Other studies from the United States demonstrate that migrant farmworkers experience a lack of control over the conditions of their work environment, and have little control over avoiding the possible harmful effects of pesticides (211, 213, 230). Larson (30) found that even the extent to which pesticides pose a health problem is unclear, due to underreporting and lack of clinician training. Several studies maintain that migrant farmworkers in the United States with an H-2A work visa more frequently receive pesticide safety training. Arcury *et al.* (210) argue that additional regulation is not sufficient to improve pesticide safety and sanitation among migrant farmworkers, and the emphasis for intervention must include educating farmers as well as farmworkers. In this respect, one study suggests that that farmworkers' rights to a safe working environment are best protected by elimination of hazardous pesticides and their replacement with safer, less toxic pest-management tools (17).

Since migrant farmworkers are often hired illegally and on a temporary basis, researchers and policy-makers often find it difficult to access migrant farmworker communities. The migratory nature of the workforce in this sector is another potential barrier. Due to their illegal and vulnerable position, many migrant farmworkers are not particularly interested in being studied (221). Moreover, the problem of underreporting leads to very limited information being available to assess the extent of occupational injuries and illnesses affecting migrant farmworkers in the United States (214). In light of these potential barriers, several methodologies, namely camp sampling, participatory research, and community-based approach models have been developed. Despite their flaws, these models show an improvement in assessing the health hazards that migrant farmworkers experience in their daily work (8, 84).

As our findings indicate, a participatory research model (community-based approach) was the most common model for United States researchers to assess and reduce pesticide exposure among migrant farmworkers and their families (30, 208, 212, 225, 228). The bulk of these authors argue that community-based participatory research, which engages the community at every stage of the research process, provides a model for mobilizing stakeholders and community members around the issue. One of the main advantages of this model is that it enables researchers to apply culturally appropriate research methods in migrant farmworker communities. In the State of Oregon, an agency advocating for the migrant farmworker community and university researchers have implemented a research programme focusing on reducing pesticide exposure among the children of migrant farmworkers (225). The research process has included both qualitative research methods with members of the migrant farmworker community and quantitative approaches to assess pesticide dust residues in migrant farmworkers' homes, biomarkers of pesticide exposure, and effects on health. Research findings demonstrated that researchers and migrant community

members have different perceptions of the benefits of community involvement and the effects of pesticide exposure on health (225).

In addition, the lay health promoter or Promotora de Salud model has been extensively used by advocacy and academic organizations in the United States as a means of reducing migrant farmworkers' exposure to pesticides (30, 212). For instance, AmeriCorps Volunteers have been placed in community-based organizations to focus on migrant farmworker pesticide health and safety training. Half of these volunteers have also been placed in Migrant Health Centers throughout the United States. Other pesticide safety training programmes focused on train-the-trainer techniques to teach community members how to educate others (231). Lay health workers have also been used as educators in migrant communities. The camp sampling model has been mainly used in North Carolina for assessing pesticide exposure among farmworkers. However, studies suggest that this model fails to produce accurate results if some camps are not identified or are not sampled in the study (94).

In their study of Florida migrant farmworkers, Mayer *et al.* (224) state that the role of employers and supervisors is crucial in promoting pesticide safety behaviour among migrant farmworkers. These authors suggest that the provision of written notices of recent pesticide applications and the provision of convenient handwashing facilities by employers/supervisors might improve the workplace hygiene among migrant farmworkers. Other studies put forth recommendations for employers, researchers and funding agencies to facilitate the integration of the workers' perspective into occupational health and safety in agriculture (223).

A growing body of literature suggests that migrant farmworkers can reduce the health risks posed by pesticide exposure through developing their self-protective behaviours (55, 75, 215). The suggested interventions include: separating work clothes from non-work clothes for laundry, wearing work clothes only once before washing (215), changing out of work clothes before returning home from the fields (55) and using protective clothing while in the field, such as gloves, long-sleeve shirts, and coveralls (75). From this perspective, Cabrera and Leckie (13) maintain that translating information and perceptions of risk into increased self-protective behaviours is crucial for decreasing the health risks associated with pesticides. Accordingly, the health risks posed by pesticide exposure can be reduced through a combination of education and modification of behaviour among migrant farmworkers (78). The efficiency of bilingual pesticide programmes in promoting self-protective behaviours has been reported. In this regard, Burke *et al.* (217) suggest that training involving behavioural modelling, practice, and dialogue is more fruitful than other methods of health and safety training.

Paradoxically, Cabrera's and Leckie's (13) study has shown that, even though migrant farmworkers received information about the health consequences of pesticide exposure from both grower-based training and personal social networks, they continued to carry on unnecessarily risky behaviours. This is relatively consistent with Sorensen *et al.* (229) and Pratt *et al.* (227), who maintain that migrant farmworkers have a remarkably high tolerance for risk and adopt an optimistic bias with regard to occupational hazards, resulting in higher rates of injuries to migrant farmworkers compared to workers in other sectors. These findings are consistent with Arcury *et al.* (209), who found that previous pesticide use experiences that migrant farmworkers bring from their home communities influence the way in which these workers understand the consequences of pesticide usage on human health. In other words, those migrant farmworkers who had worked as hired farm labour in Mexico were more likely to have used pesticides and to have had safety training and information, whereas those who spoke an indigenous language at home rather than Spanish were less likely to have used pesticides and to have received safety training and information.

Some studies propose that strict legal measures may improve farmworkers' working conditions. In this respect, Davis *et al.* (219) claim that there are three regulatory systems under United States legislation that may induce farmers to protect farmworkers from pesticide-related harm: tort liability, administrative agency regulation and workers' compensation system. In this regard, Davis *et al.* empirically examined the farmer's decision whether to comply with required precautions as well as penalties for noncompliance. Their findings indicate that tort liability and administrative agency

regulation provide insignificant incentives, while a workers' compensation system, if fully experience-rated, may offer a more effective incentive.

There has been a tendency to develop models that address the ergonomic risks, since migrant farmworkers provide much of the manual labour for planting, pruning, and harvesting of fruits and vegetables. One common result of this activity is musculoskeletal injuries caused by carrying heavy loads and holding awkward postures. In this regard, several studies investigated the efficiency of using ergonomic hip belts designed to redistribute weight from the upper back, neck, and shoulders to the hips (84, 85). These studies found that the hip belt intervention produces significant reductions in muscle pain while in a posture commonly assumed during orchard work.

Table 11. Characteristics of the studies regarding models to address problems in migrant farmwork

Author	Country of study	Type of publication/study
Arcury et al. 1999 (207)	United States, North Carolina	Journal article, interviews, fixed answer questionnaires, quantitative
Arcury, Quandt and McCauley 2000 (208)	United States	Journal article, review, information analysis
Arcury et al. 2001a (209)	United States, North Carolina	Journal article, in-depth interviews, quantitative
Arcury et al. 2001b (210)	United States, North Carolina	Journal article, information analysis
Arcury, Quandt and Russell 2002 (211)	United States, North Carolina	Journal article, interviews, quantitative
Arcury, Quandt and Mellen 2003 (8)	United States, North Carolina	Journal article, quantitative
Arcury, Estrada and Quandt 2010 (212)	United States	Journal article, information analysis
Austin et al. 2001 (213)	United States, North Carolina	Journal article, review
Azaroff, Levenstein and Wegman 2002 (214)	United States	Journal article, statistics analysis
Braaten 1996 (215)	United States	Report, guidelines for safely laundering pesticide-contaminated clothing
Buhler et al. 2007 (216)	United States, North Carolina	Journal article, information analysis
Burke et al. 2006 (217)	United States	Journal article, intervention, quantitative
Cabrera and Leckie 2009 (13)	United States, California	Journal article, qualitative
Columbia Legal Services 1998 (218)	United States, Washington	Report, information analysis
Davis, Caswell and Harper 1992 (219)	United States	Journal article, review
Davis and Schleifer 1998 (220)	United States, Florida	Report, information analysis
Earle-Richardson, May and Ivory 1998 (221)	United States, New York	Journal article, individual and focus group interviews
Earle-Richardson et al. 2008 (84)	United States, New York	Journal article, review, assessment of a previous study, information analysis
Earle-Richardson et al. 2006 (85)	United States, New York	Journal article, review
Goldman et al. 2004 (55)	United States, California	Journal article, interviews, data analysis
Larson 2000 (222)	United States	Report, information analysis
Larson 2001a (30)	United States	Report, information analyses
Liebman and Augustave 2010 (223)	United States	Journal article, review
Mayer, Flocks and Monaghan 2010 (224)	United States, Florida	Journal article, surveys, quantitative
May 2009 (94)	United States	Book chapter, review
McCauley et al. 2001 (225)	United States, Oregon	Journal article, information analysis, statistics analysis
Perry and DiFonzo 1998 (226)	United States, Michigan	Report, information analysis
Pratt et al. 1992 (227)	United States, New York	Journal article, population-based study and observations
Quandt et al. 2001 (228)	United States, North Carolina	Journal article, qualitative intervention
Sorensen et al. 2008 (229)	United States, New York	Journal article, qualitative interviews
Strong et al. 2008 (230)	United States, Washington	Journal article, interviews, quantitative
Weinger and Lyons 1992 (231)	Nicaragua, United States and Puerto Rico	Journal article, participatory and action-oriented educational methodology
Whalley et al. 2009 (232)	United States, North Carolina	Journal article, interviews, quantitative

Knowledge about good practices

The findings of our study indicate that there is no single model or programme or policy that can comprehensively address policy challenges posed by growing migration. As we discussed earlier, major migrant destination countries, such as the United States, Canada, Australia and EU Member States have not ratified UN and ILO conventions pertaining to migrant workers. Most international discussions call on developed countries to open their borders to more migrants. At the same time,

there is a growing debate about the need to protect migrant worker rights in receiving countries. In this regard, countries often face trade-offs between migrant numbers and rights. The Global Commission on International Migration (234) defines good practices as 'carefully designed temporary migration programmes as a means of addressing the economic needs of both countries of origin and destination'. In the light of this definition, it may be difficult to describe what might constitute good practice in managing migration, given the trade-offs between migrant numbers and rights. Nevertheless, in this section we attempt to describe the 'good practices' drawing on the existing literature on this topic.

According to Castles (142), migration policies often fail to achieve their declared objectives or have unintended consequences. Castles mentions three important factors that make and unmake migration policies: (a) the social dynamics of migratory process; (b) the impact of globalization and transnationalism trends; and (c) hidden political agendas. Castles therefore argues that migration policies that consider the migratory process as a long-term dynamic social process are sustainable in the long run and can thus be regarded as a 'good practice'. This argument reinforces Martin's (127, 236) definition that 'best practices include policy instruments that reduce goal-outcome gaps, that is, minimize distortion and dependence by using economic mechanisms to reduce distortions and dependence. A better system would involve levies or taxes paid by employers and fewer admission rules, which would help to ensure that employers continuously consider alternatives to migrants because, if they find alternatives to migrants, they save levies. The second economic instrument concern migrants who are expected to return. To encourage returns, migrant social security taxes could be refunded. No country uses both employer levies and migrant refunds. Seasonal programmes that admit migrants for farm jobs may be the best place to test employer levies and migrant refunds (*ibid.*).

Studies suggest that 'managed migration' represents a new model of immigration policy. As Reed (237) defines, 'managed migration is the practice of regulating the conditions of cross-border movement, which entails a form of documented movement that ensures both sending and receiving governments know how, when, and where an individual is working during the tenure of the overseas employment contract'. Under the policy framework of managed migration, governments specify the number and types of workers permitted to move, as well as the number and types of citizenship rights afforded to the worker. Both sending and receiving countries of these workers are motivated by economic considerations, and benefit from maintaining a permanent migration circuit that moves workers back and forth between them. Overall, the practice of managed migration has two direct effects and one indirect effect. The first direct effect is that it controls cross-border movement between countries. The second direct effect is that it provides a clear set of rules and guidelines for policy implementation and programme operations. The indirect effect is that it yields varying degrees of cooperation between sending and receiving governments. In other words, managed migration relies on intergovernmental cooperation and is only at its most effective when both the sending and the receiving governments comply with the rules of the programme.

Canada's experience with migration is internationally known as one of the best practices of managed migration policy. Canada runs two major temporary foreign worker programmes that represent managed migration: the Seasonal Agricultural Workers Programme (SAWP) and the Live-in Caregiver (LCP) Programme. Despite its flaws, the SAWP has been regarded as a 'best practice' in both academic and policy debates. According to Preibisch and Binford (175), SAWP is a noteworthy example of immigration policy in regulating the labour markets of high-income economies and ensuring the position of labour-receiving states within the global political economy. Under the SAWP, Mexican authorities select guest workers and ensure their qualifications, and Mexican consuls in Ontario, Quebec and elsewhere are charged with protecting the rights of the temporary migrants and resolving conflicts between them and their Canadian employers. Guarantees and bureaucratic oversight makes the SAWP superior to the earlier United States Bracero programme (1942-1964), or the current H2A programme in the United States.

What is notable in Canadian migration experience is that numerous challenges to provincial exclusions of migrant farm workers from labour, health and safety protections have been brought

about on human rights ground (169). The involvement of civil society state actors operating at a variety of scales –local, national, international, and the extra-territorial – in a range of social justice struggles expands access to social citizenship rights for Mexican migrant workers (233). Despite the common description of the bilateral Canadian SAWP Programme as a 'best practice', questions are raised about the ability of workers to access citizenship rights and even limited labour protection. Foreign labour supplied under the SAWP secures a flexible workforce for employers and thus improves Canada's trade competitiveness in the global agrifood market. Under the SAWP, migrant workers can stay and work in Canada for up to eight months, but their permission to work is tied to a single employer. It is precisely this element that makes migrant workers a highly vulnerable labour force. Since migrant workers are tied to their employers and cannot move to more attractive work sites, they have limited bargaining power to press for improved working or living conditions (95). Under the SAWP, migrant workers are deprived of collective bargaining rights and subjected to long hours of hard labour at wages that are unattractive to most domestic workers.

Martin (127, 236) argues that the most common policy prescription is for earned adjustment, a system in which unauthorized and quasi-authorized foreigners, who satisfy residence, work, and and/or integration tests are allowed to become legal long-term residents and workers. However, as Martin claims, such a policy may run the risk of encouraging more unauthorized migration by signalling to potential migrants that the best way to obtain an immigration status is to get into another country. This would have to be considered a one-off rather than an ongoing programme. In this connection, Spain's experience with managing labour migration has been intensely discussed in academic circles, since Spain has turned its undocumented migrant workers into legal workers by undertaking regularization. While most Spaniards think that regularization of undocumented helped to combat the black market, other EU Member States continue to blame Spain for making the country more attractive for undocumented migrants (235).

The British Gangmaster (Licensing) Act represents one of the best practices when it comes to improving working conditions of migrant farmworkers. The British Gangmaster (Licensing) Act has been implemented by the state with the intention of protecting workers from abusive employment practices by labour-contracting intermediaries, known as gangmasters. The new licensing regime only operates in agriculture and closely related sectors (200). The opening of the British labour market to the nationals of the eight Eastern European countries that acceded to the EU in May 2004 also had protective outcomes, as it enabled many workers, who were already resident and working without the legal right to do so, to improve their status and conditions. Supermarkets, mindful of their deteriorating public image following revelations of illegal practices by gangmasters in their supply channels, played a key role in supporting gangmaster licensing.

Table 12. Characteristics of the studies regarding 'good practices' to improve migrant farmworkers' health and working conditions

Author	Country of study	Type of publication/study
Castles 2004 (142)	Global	Journal article, review
Gabriel and Macdonald 2011 (233)	Canada, Ontario	Journal article, review
GCIM 2005 (234)	Global	Journal article, review
Hanson, Otero and Preibisch 2006 (169)	Canada, British Columbia	Conference paper, information analysis, statistics analysis
IOM 2008 (3)	Global	Journal article, review
Lopez 2011 (235)	Spain	Journal article, review
Martin 2006 (127)	Global	Conference paper, review
Martin 2007 (236)	Global	Journal article, review
Preibisch 2005 (95)	Canada	Article, information analysis
Preibisch and Binford 2007 (175)	Canada, Ontario	Journal article, review
Reed 2008 (237)	Canada	Journal article, information analysis
Rogaly 2008a (200)	Great Britain	Journal article, review

Conclusions

This study aimed to compile existing knowledge on migrant workers in agriculture. In doing so, we undertook an exhaustive literature review on the topic available from peer-reviewed articles, books,

research reports, and other academic publications. We tried to provide a global overview of the migrant work in the agriculture in different geographical and situational contexts. Reviewing the literature on this topic proved to be a complex task, since the nature and scope of the studies included were extremely diverse. Despite the existence of international standards for protecting migrant worker rights, the labour and health conditions of migrant workers still continue to be poorer than for domestic workers.

In spite of their varying geographical focus, scope, unit of analysis and settings, most of the studies reviewed highlighted that migrant farmworkers work under very poor working conditions and face numerous health and safety hazards, including occupational chemical and ergonomic exposures, various injuries and illnesses and even death. The study has accumulated a rich set of data in relation to health effects of migrant farmworkers' exposure to various chemicals, probably because there is an extensive literature on this field, although not all of these studies are of high quality. Many studies also reported poor enforcement of labour regulations and a lack of health and safety training on the farms, difficulty accessing medical care and compensation when injured or ill. The studies reviewed pointed to numerous factors, ranging from inefficient laws, economic variables to the social and cultural backgrounds of migrant workers, which challenged the improvement of migrant worker rights. The studies have also pointed out the lack of research in relation to labour and wage conditions of migrant farmworkers. In this regard, the accumulated results of the study indicate that the issues and problems migrant farmworkers face are multidimensional, and this requires multifaceted approaches to address migrant workers' problems in different geographical and situational contexts.

Despite their geographical diversity, the studies tend to propose similar reasons to explain migrant farmworker situations in different countries, including the involvement of migrant farmworkers in the most dangerous jobs and the most dangerous tasks within these jobs, lack of safety training, discrimination and social exclusion, poor pay and long working hours, the exploitative nature of much of the work, fear of retaliation for demanding better work conditions or reporting an injury or illness, and language and cultural barriers that minimize the efficiency of safety training or hampers the delivery of adequate medical care.

As we initially expected, most of the studies reviewed come from established countries of immigration, such as the United States and Canada which have a long immigration history, whereas in the European context, most of the studies are concerned with southern European countries, Spain in particular. However, it should be noted that migrant farmworkers largely suffer from poor working conditions even in countries with a long history of immigration (United States, Canada). Much of the reviewed literature highlights a great need for further research in this field, given the unrelenting increase in the number of migrants internationally. In this connection, our literature review indicates that, despite the existence of a significant body of literature on the topic, this area still remains underresearched, particularly in Europe, where migration has become a widespread phenomenon just after the EU enlargement.

Several methodological issues arose in this review. One problem is that the studies do not appropriately define 'migrant populations' according to the context of the study. As a result, it was quite difficult to determine whether or not the study in question is concerned with migrant populations. For example, some studies interchangeably use 'migrants' and 'immigrants', thereby blurring the boundary between temporary and permanent nature of foreign labour. Moreover, some studies frequently refer to 'farmworkers' when describing for example Mexican migrant workers labouring in Canada or the United States. Such issues became especially important in this literature review, as we were mainly interested in gathering data in relation to migrant workers labouring in agriculture.

In a preliminary literature search, it became evident that we would also need to use other keywords and terms for collecting necessary data. Keywords such as *farmworkers, agricultural workers, guest workers and seasonal workers* were often used to refer to non-native workers. In some studies, it was impossible to identify whether the focus is on migrant workers or native workers. Therefore, our search methodology was flexible, and we continuously updated our search

strategy as we became more familiar with the subject terminology. Nevertheless, the methodology that we used in our preliminary search helped us to decide which data to continue to search, and our research interests and focus shaped the methodological changes. As we have attempted to make clear, less focus was placed on the term 'migrant worker' and more on the significance of that word in the context of agriculture. Moreover, we were mainly interested in temporary and seasonal migrant workers, not in permanent immigrants, mainly due to the specific focus of our review on migrant agricultural workers.

The study had several limitations. We used *LibHub* and *Google Scholar* as our main source of literature identification, because the former is widely used at Lund University, while the latter was used to make up for the possible shortcomings of the former. Nevertheless, we recognize that our study is not without limitations, including publication bias and relevant studies in other fields that our search engines might not include. However, the use of both *LibHub* and *Google Scholar* helps us to form an idea of migrant work in the agriculture and the areas in which more knowledge is necessary. Another possible limitation is the selection of English articles for review. Eighteen articles were excluded for reasons of language: nine in Spanish, four in German, four in French, and one in Italian. Our non-use of quality criteria in selecting articles for review can also be regarded as a limitation of this review. However, our main objective was to collect the existing reports on migrant work in agriculture in order to convey a broad understanding of the subject.

In conclusion, this literature review serves to compile knowledge about migrant workers in the agriculture available from journal articles, books, reports, policy papers and other relevant academic publications. This review also intends to provide a global overview of migrant work in agriculture in different geographical and situational contexts, in order to allow readers to focus on issues depending on their interest and to critique and apply these issues in their own context.

Acknowledgments

This study was financed by a grant from the Swedish Work Environment Authority

References

1. UN DESA, 2009. *Trends in International Migrant Stock: The 2008 Revision*, New York: United Nation Department of Economic and Social Affairs (UN DESA), Population Division. Available at: http://www.un.org/esa/population/publications/migration/UN_MigStock_2008.pdf.
2. United Nations, 2009. International Migration Report 2006: A Global Assessment. Available at: http://www.un.org/esa/population/publications/2006_MigrationRep/report.htm.
3. IOM, 2008. *"'Chapter 1: Low and Semi-skilled Workers Abroad.'" World Migration 2008.*, Geneva: International Organization for Migration. Available at: http://www.iom.int/jahia/webdav/site/myjahiasite/shared/shared/mainsite/published_docs/studies_and_reports/WMR2008/Ch3_WMR08.pdf.
4. UN DESA, 2004. *World Economic and Social Survey 2004: International Migration*, United Nations Department of Economic and Social Affairs (UN DESA), New York, UN. Available at: http://www.un.org/esa/policy/wess/wess2004files/part2web/preface.pdf.
5. Reeves, M. & Schafer, K.S., 2003. Greater risks, fewer rights: U.S. farmworkers and pesticides. *International Journal of Occupational and Environmental Health*, 9, pp.30–39.
6. Abella, M., 2006. Policies and Best Practices for Management of Temporary Migration. In *Paper Presented at the International Symposium on International Migration and Development, United Nations Department of Economic and Social Affairs (UN DESA), Population Division, 28-30 June, 2006*. Turin. Available at: http://www.un.org/esa/population/migration/turin/Symposium_Turin_files/P03_SYMP_Abella.pdf.

7. Ahonen, E., Benavides, F. & Benach, J., 2007. Immigrant populations, work and health – a systematic literature review. *Scandinavian Journal of Work, Environment & Health*, 33(2), pp.96–104.
8. Arcury, Thomas A, Quandt, S. A & Mellen, B.G., 2003. An Exploratory Analysis of Occupational Skin Disease Among Latino Migrant and Seasonal Farmworkers in North Carolina. *Journal of Agricultural Safety and Health*, 9(3), pp.221–232.
9. Bazylewicz-Walczak, B., Majczakowa, W. & Szymczak, M., 1999. Behavioral effects of occupational exposure to organophosphorous pesticides in female greenhouse planting workers. *NeuroToxicology*, 20(5), pp.819–26.
10. Blake, J., 1969. Ocular hazards in agriculture. *Ophthalmologica*, 158, pp.125–135.
11. BLC, 2000. *Workplace Injuries and Illnesses in 1999*, Washington, DC: Bureau of Labor Statistics.
12. Bollini, P. & Siem, H., 1995. No real progress towards equity: Health of migrants and ethnic minorities on the eve of the year 2000. *Soc Sci Med*, 41(6), pp.819–828.
13. Cabrera, N.L. & Leckie, J.O., 2009. Pesticide Risk Communication, Risk Perception, and Self-Protective Behaviors Among Farmworkers in California's Salinas Valley. *Hispanic Journal of Behavioral Sciences*, 31(2), pp.258–272.
14. Cameron, L. et al., 2006. Occupational health survey of farm workers by camp health aides. *Journal of Agricultural Safety and Health*, 12(2), pp.139–153.
15. Carballo, M., Divino, J.J. & Zeric, D., 1998. Migration and health in the European Union. *Tropical Medicine & International Health*, 3(12), pp.936–944.
16. Ciesielski, S. et al., 1994. Pesticide exposures, cholinesterase depression, and symptoms among North Carolina migrant farmworkers. *American Journal of Public Health*, 84, pp.446–451.
17. Das, R. et al., 2001. Pesticide-related illness among migrant farm workers in the United States. *International Journal of Occupational and Environmental Health*, 7(4), pp.303–312.
18. Earle-Richardson, G. et al., 2003. Occupational injury and illness among migrant and seasonal farmworkers in New York State and Pennsylvania, 1997–1999: pilot study of a new surveillance method. *American Journal of Industrial Medicine*, 44(1), pp.37–45.
19. Forst, L. et al., 2004. Effectiveness of community health workers for promoting use of safety eyewear by Latino farm workers. *American Journal of Industrial Medicine*, 46(6), pp.607–613.
20. Frank, A.L. et al., 2004. Issues of Agricultural Safety and Health. *Annual Review of Public Health*, 25(1), pp.225–245.
21. Garcia, J.G.., Dresser, K.S.. & Zerr, A.., 1996. Respiratory health of Hispanic migrant farmworkers in Indiana. *American Journal of Industrial Medicine*, 29(23-32).
22. Gomes, J., Lloyd, O.L. & Revitt, D.M., 1999. The influence of personal protection, environmental hygiene and exposure to pesticides on the health of immigrant farm workers in a desert country. *International Archives of Occupational and Environmental Health*, 72(1), pp.40–45.
23. Hansen, E. & Donohoe, M., 2003. Health issues of migrant and seasonal farmworkers. *Journal of Health Care for the Poor and Underserved*, 14(2), pp.153–164.
24. Hard, D.L., Myers, J.R. & Gerberich, S.G., 2002. Traumatic injuries in agriculture. *Journal of Agricultural Safety and Health*, 8(1), pp.51–65.
25. Kamel, F et al., 2007. Neurologic symptoms in licensed pesticide applicators in the Agricultural Health Study. *Human & Experimental Toxicology*, 26(3), pp.243–250.
26. Kamel, Freya et al., 2003. Neurobehavioral Performance and Work Experience in Florida Farmworkers. *Environmental Health Perspectives*, 111(14), pp.1765–1772.
27. Kirkhorn, S. R & Schenker, M.B., 2002. Current health effects of agricultural work: respiratory disease, cancer, reproductive effects, musculoskeletal injuries, and pesticide-related illnesses. *Journal of Agricultural Safety and Health*, 8(2), pp.199–214.

28. Kowalski, K., Hoffman, C.J. & Mcclure, A., 1999. Nutritional patterns and needs of migrant farm workers in Northwest Michigan. *Journal of the American Dietetic Association*, 99(2), pp.221–224.
29. Krejci-Manwaring, J. et al., 2006. Skin Disease Among Latino Farmworkers in North Carolina. *Journal of Agricultural Safety and Health*, 12(2), pp.155–163.
30. Larson, A., 2001a. Environmental/Occupational Safety and Health. In *Migrant health issues monograph series no. 2*. Buda, TX: National Center for Farmworker Health. Available at: http://www.ncfh.org/docs/02%20-%20environment.pdf.
31. May, J.J. & Kullman, G.J., 2002. Agricultural safety and health in a new century. *American Journal of Industrial Medicine*, 42(S2), pp.1–2.
32. McConnell, Rob, Keifer, Matthew & Rosenstock, Linda, 1994. Elevated quantitative vibrotactile threshold among workers previously poisoned with methamidophos and other organophosphate pesticides. *American Journal of Industrial Medicine*, 25(3), pp.325–334.
33. McCurdy, S.A. et al., 2002. Injury risks in children of California migrant Hispanic farm worker families. *American Journal of Industrial Medicine*, 42(2), pp.124–133.
34. McDermott, S. & Lee, C.., 1990. Injury among male migrant farm workers in South Carolina. *Journal of Community Health*, 15(5), pp.297–305.
35. Moses, M. et al., 1993. Environmental equity and pesticide exposure. *Toxicology and industrial health*, 9(5), pp.913–59.
36. Muniz, J.F. et al., 2008. Biomarkers of oxidative stress and DNA damage in agricultural workers: A pilot study. *Toxicology and Applied Pharmacology*, 227(1), pp.97–107.
37. Myers, J., 1997. *Injuries among farmworkers in the United States, 1993*, Cincinnati, OH: U.S. Department of Health and Human Services.
38. Mysyk, A., England, M. & Gallegos, J.A.A., 2008. Nerves as Embodied Metaphor in the Canada/Mexico Seasonal Agricultural Workers Program. *Medical Anthropology*, 27(4), pp.383–404.
39. Parrón, T., et al., 1996a. Clinical and biochemical changes in greenhouse sprayers chronically exposed to pesticides. *Human & Experimental Toxicology*, 15, pp.957–963.
40. Parrón, T., et al., 1996b. Increased risk of suicide with exposure to pesticides in an intensive agricultural area. A 12-year retrospective study. *Forensic Science International*, 79(1), pp.53–63.
41. Quandt, Sara A et al., 2001. Eye Symptoms and Use of Eye Protection Among Seasonal and Migrant Farmworkers. *Southern Medical Journal*, 94(6). Available at: http://www.medscape.com/viewarticle/410804.
42. Robinson, J.C., 1989. Exposure to occupational hazards among Hispanics, blacks and non-Hispanic whites in California. *Am J Public Health*, 79(5), pp.629–630.
43. Rohlman, D.S. et al., 2001. Assessment of Neurobehavioral Function with Computerized Tests in a Population of Hispanic Adolescents Working in Agriculture. *Environmental Research*, 85(1), pp.14–24.
44. Rohlman, D.S., Anger, W. Kent & Lein, P.J., 2011. Correlating neurobehavioral performance with biomarkers of organophosphorous pesticide exposure. *NeuroToxicology*, 32(2), pp.268–276.
45. Rosenstock, L. et al., 1991. Chronic central nervous system effects of acute organophosphate pesticide intoxication. *The Lancet*, 338(8761), pp.223–227.
46. Salvatore, A.L. et al., 2008. Occupational behaviors and farmworkers' pesticide exposure: Findings from a study in Monterey county, California. *American Journal of Industrial Medicine*, 51(10), pp.782–794.
47. Schenker, M.B., 2010. A global perspective of migration and occupational health. *American Journal of Industrial Medicine*, 53(4), pp.329–337.
48. Schenker, M.B., Ferguson, T. & Gamsky, T., 1991. Respiratory risks associated with agriculture. *Occupational Medicine*, 6, pp.415–428.

49. Schenker, M.B., Lopez, R. & Wintermute, G., 1995. Farm-related fatalities among children in California. 1980 to 1989. *American Journal of Public Health*, 85, pp.89–92.
50. Stueland, D. et al., 1995. The Relationship of Farm Residency Status to Demographic and Service Characteristics of Agricultural Injury Victims in Central Wisconsin. *The Journal of Rural Health*, 11(2), pp.98–105.
51. Cabrera, M., 1991. Legal remedies for victims of pesticide exposure. *The Kansas Journal of Law Public Policy*, pp.113–126.
52. Dullinger, D.R., 1987. Cursed is the ground: Pesticide regulation and farmworkers. *Law and Inequality*, 5, pp.453–486.
53. Eckerman, D.A. et al., 2009. Behavioral observation used to estimate pesticide exposure for farm workers in Brazil. *Psychology & Neuroscience (Online)*, 2, pp.43–50.
54. Figa-Talamanca, I. et al., 1993. Cancer Mortality in a Cohort of Rural Licensed Pesticide Users in the Province of Rome. *International Journal of Epidemiology*, 22(4), pp.579–583.
55. Goldman, L. et al., 2004. Risk behaviors for pesticide exposure among pregnant women living in farmworker households in Salinas, California. *American Journal of Industrial Medicine*, 45(6), pp.491–499.
56. Gomes, J. et al., 1997. Erythrocyte cholinesterase activity levels in desert farm workers. *Occupational Medicine*, 47(2), pp.90–94.
57. Jacobs, M. & Dinham, B., 2003. *Silent invaders: perticides, livelihoods and women's health*, London: Zed Books.
58. Jaga, K. & Dharmani, C., 2003. Sources of exposure to and public health implications of organophosphate pesticides. *Revista Panamericana de Salud Pública*, 14, pp.171–185.
59. Lee, B.W. et al., 2003. Association Between Human Paraoxonase Gene Polymorphism and Chronic Symptoms in Pesticide-Exposed Workers. *Journal of Occupational and Environmental Medicine*, 45(2), pp.118–122.
60. Mills, P.K., Dodge, J. & Yang, R., 2009. Cancer in Migrant and Seasonal Hired Farm Workers. *Journal of Agromedicine*, 14, pp.185–191.
61. Mills, P.K. & Yang, R., 2003. Prostate Cancer Risk in California Farm Workers. *Journal of Occupational and Environmental Medicine*, 45(3), pp.249–258.
62. Moses, M., 1989. Pesticide-related health problems and farmworkers. *American Association of Occupational Health Nurses*, 37, pp.115–130.
63. Nasterlack, M., 2006. Do pesticides cause childhood cancer? *International Archives of Occupational and Environmental Health*, 79(7), pp.536–544.
64. Nasterlack, M. & Zober, A., 2006. Renal and Hepatic Disease. In *Agricultural Medicine*. New York: Springer, pp. 260–268. Available at: http://dx.doi.org/10.1007/0-387-30105-4_20.
65. O'Malley, M., 1997. Skin reactions to pesticides. *Occupational Medicine*, 12(2), pp.327–345.
66. Purschwitz, M.. & Field, W.., 1990. Scope and magnitude of injuries in the agricultural workplace. *American Journal of Industrial Medicine*, 18, pp.179–192.
67. Rohlman, D.S. et al., 2005. Neurobehavioral Performance in Preschool Children from Agricultural and Non-Agricultural Communities in Oregon and North Carolina. *NeuroToxicology*, 26(4), pp.589–598.
68. Rohlman, D.S. et al., 2007. Neurobehavioral Performance of Adult and Adolescent Agricultural Workers. *NeuroToxicology*, 28(2), pp.374–380.
69. Salazar, M.K. et al., 2004. Hispanic Adolescent Farmworkers' Perceptions Associated with Pesticide Exposure. *Western Journal of Nursing Research*, 26(2), pp.146–166.
70. Schenker, M.B., Lopez, R. & Wintermute, G., 1995. Farm-related fatalities among children in California. 1980 to 1989. *American Journal of Public Health*, 85, pp.89–92.
71. Schilmann, A. et al., 2010. Identifying pesticide use patterns among flower growers to assess occupational exposure to mixtures. *Occupational and Environmental Medicine*, 67(5), pp.323–329.
72. Shaver, C.. & Tong, T., 1991. Chemical hazards to agricultural workers. *Occupational Medicine*, 6, pp.391–413.

73. Simcox, N.. et al., 1999. Farmworker Exposure to organophosphorus pesticide residues during apple thinning in central Washington state. *American Industrial Hygiene Association Journal*, 60, pp.752–761.
74. Strigini, P., 1982. On the Political Economy of Risk: Farmworkers, Pesticides, and Dollars. *International Journal of Health Services*, 12(2), pp.263 – 292.
75. Thompson, B. et al., 2003. Pesticide Take-Home Pathway among Children of Agricultural Workers: Study Design, Methods, and Baseline Findings. *Journal of Occupational and Environmental Medicine*, 45(1), pp.42–53.
76. Van Maele-Fabry, G. & Willems, J.L., 2004. Prostate cancer among pesticide applicators: a meta-analysis. *International Archives of Occupational and Environmental Health*, 77(8), pp.559–570.
77. Varona, M. et al., 2003. Alteraciones citogenéticas en trabajadoras con riesgo ocupacional de exposición a plaguicidas en cultivos de flores en Bogota. *Biomédica*, 23, pp.141–152.
78. Vaughan, E., 1993. Individual and cultural differences in adaptation to environmental risks. *American Psychologist;American Psychologist*, 48(6), pp.673–680.
79. Villarejo, D. & Baron, SL, 1999. The occupational health status of hired farm workers. *Occupational Medicine*, 14(3), pp.613–635.
80. Von Essen, S.G. & McCurdy, S.A., 1998. Health and safety risks in production agriculture. *Western Journal of Medicine*, 169(4), p.214.
81. Wilk, V.A., 1986. *The Occupational Health of Migrant and Seasonal Farmworkers in the United States. Second Edition.*, Kansas: MO: Farmworker Justice Fund, Inc., Washington, DC.
82. Zahm, S.H. & Blair, A., 1993. Cancer among migrant and seasonal farmworkers: An epidemiologic review and research agenda. *American Journal of Industrial Medicine*, 24(6), pp.753–766.
83. Davis, K.G. & Kotowski, S.E., 2007. Understanding the ergonomic risk for musculoskeletal disorders in the United States agricultural sector. *American Journal of Industrial Medicine*, 50(7), pp.501–511.
84. Earle-Richardson, G. et al., 2008. Electromyographic assessment of apple bucket intervention designed to reduce back strain. *Ergonomics*, 51(6), pp.902–919.
85. Earle-Richardson, G. et al., 2006. Laboratory evaluation of belt usage with apple buckets. *American Journal of Industrial Medicine*, 49(1), pp.23–29.
86. Estill, C.. & Tanaka, S., 1998. Ergonomic considerations of manually harvesting Maine wild strawberries. *Journal of Agricultural Safety and Health*, 4, pp.43–57.
87. Mines, R., Mullenax, N. & Saca, L., 2001. *The Binational Farmworker Health Survey: An In-depth Study of Agricultural Worker Health in Mexico and the United States*, Davis, CA: California Institute for Rural Studies.
88. Palmer, K.., 1996. Musculoskeletal problems in the tomato growing industry: tomato trainer's shoulder. *Occupational Medicine*, 46, pp.428–431.
89. Quandt, S.A. et al., 2010. Heavy metals exposures among Mexican farmworkers in eastern North Carolina. *Environmental Research*, 110(1), pp.83–88.
90. Strong, M.. & Maralani, V.., 1998. *Farmworkers and Disability: Results of a National Survey*, Berkeley, CA: Berkeley Planning Associates.
91. Villarejo, D. et al., 2000. *Suffering in Silence: A Report on the Health of California's Agricultural Workers*, Woodland Hills, CA: The California Endowment.
92. Callejón-Ferre, A.. et al., 2009. Ergonomics and psycho-sociological indices in greenhouses, Almeria (Spain). *Spanish Journal of Agricultural Research*, 7(1), pp.50–58.
93. Henke, W. & Jurewicz, J., 2004. The risk of adverse reproductive and developmental disorders due to occupational pesticide exposure: an overview of current epidemiological evidence. *International Journal of Occupational and Environmental Health*, 17, pp.223–243.
94. May, J.J., 2009. Occupational Injury and Illness in Farmworkers in the Eastern United States. In *Latino Farmworkers in the Eastern United States*. New York: Springer, pp. 71–101. Available at: http://dx.doi.org/10.1007/978-0-387-88347-2_4.

95. Preibisch, K., 2005. Gender Transformative Odysseys: Tracing the Experiences of Transnational Migrant Women in Rural Canada. *Canadian Women Studies*, 24(4), pp.91–97.
96. Steinhorst, B. et al., 2007. Trauma in Hispanic Farm Workers in Eastern North Carolina: 10 Year Experience at a Level I Trauma Center. *Journal of Agromedicine*, 11(3-4), pp.5–14.
97. Basok, T., 2002. *Tortillas and Tomatoes: Transmigrant Mexican Harvesters in Canada*, Montreal & Kingston: McGill-Queen's University Press.
98. Basok, T., 2003a. Human Rights and Citizenship: the Case of Mexican Migrants in Canada. *University of Windsor Working Paper,* No. 72. Available at: http://www.escholarship.org/uc/item/3m1168t3.
99. Bauder, H., 2008. Foreign farm workers in Ontario (Canada): Exclusionary discourse in the newsprint media. *Journal of Peasant Studies*, 35(1), pp.100–118.
100. Bletzer, K.V., 2004. Open towns and manipulated indebtedness among agricultural workers in the New South. *American Ethnologist*, 31(4), pp.530–551.
101. Bletzer, K.V. & Weatherby, N.L., 2009. Variation in Drug and Alcohol Use among Agricultural Laborers: Watermelon Men in the Rural South. *Human Organization*, 68(2), pp.115 – 128.
102. Davis, D. & Low, S., 1989. *Gender, health, and illness: The case of nerves*, New York: Hemisphere Publishing Co.
103. Duke, M.R. & Carpinteiro, F.J.G., 2009. The Effects of Problem Drinking and Sexual Risk Among Mexican Migrant Workers on Their Community of Origin. *Human Organization*, 68(3), pp.328 – 339.
104. England, M., Mysyk, A. & Gallegos, J.A.A., 2007. An examination of nervios among Mexican seasonal farm workers. *Nursing Inquiry*, 14(3), pp.189–201.
105. Garcia, V., 2004. Transnational Mexican farmworkers and problem drinking: a review of the literature. *Contemporary Drug Problems*, 31, pp.129–161.
106. Griffin, J. & Soskolne, V., 2003. Psychological distress among Thai migrant workers in Israel. *Social Science & Medicine*, 57(5), pp.769–774.
107. Grzywacz, J. et al., 2006. Leaving Family for Work: Ambivalence and Mental Health Among Mexican Migrant Farmworker Men. *Journal of Immigrant and Minority Health*, 8(1), pp.85–97.
108. Ivancheva, M., 2007. Strawberry fields forever? Bulgarian and Romanian student workers in the UK. *Focaal*, 2007(49), pp.110–117.
109. Jaga, K. & Dharmani, C., 2007. The interrelation between organophosphate toxicity and the epidemiology of depression and suicide. *Reviews on Environmental Health*, 22(1), pp.57–74.
110. London, L. et al., 2005. Suicide and exposure to organophosphate insecticides: Cause or effect? *American Journal of Industrial Medicine*, 47(4), pp.308–321.
111. Magaña, C.G. & Hovey, J.D., 2003. Psychosocial Stressors Associated with Mexican Migrant Farmworkers in the Midwest United States. *Journal of Immigrant Health*, 5(2), pp.75–86.
112. Mitchell, D., 1996. *The Lie of the Land: Migrant Workers and the California Landscape*, Minneapolis: University of Minnesota Press.
113. Mobed, K., Gold, E.B. & Schenker, M.B., 1992. Occupational health problems among migrant and seasonal farm workers. *Western Journal of Medicine*, 157(3), pp.367–373.
114. Reid, S.D., 2004. Acceptance vs. isolation : community perceptions of migrant workers' participating in the Seasonal Agricultural Worker's Program in Exeter, Ontario, Canada. Available at: http://digitalcollections.sit.edu/capstones/74.
115. Reidy, T.J. et al., 1992. Pesticide exposure and neuropsychological impairment in migrant farm workers. *Archives of Clinical Neuropsychology*, 7(1), pp.85–95.
116. Schnitzer, P.G. & Shannon, J., 1999. Development of a Surveillance Program for Occupational Pesticide Poisoning: Lessons Learned and Future Directions. *Public Health Reports (1974-)*, 114(3), pp.242–248.

117. Smart, J., 1997. Borrowed Men on Borrowed Time: Globalization, Labour Migration and Local Economies in Alberta. *Canadian Journal of Regional Science*, 20(1-2), pp.100–118.
118. Stallones, L. & Beseler, C., 2002. Pesticide Poisoning and Depressive Symptoms among Farm Residents. *Annals of Epidemiology*, 12(6), pp.389–394.
119. Arcury, T.A. & Quandt, S.A., 2007. Delivery of Health Services to Migrant and Seasonal Farmworkers. *Annual Review of Public Health*, 28(1), pp.345–363.
120. Bethel, Jeffrey W. & Schenker, Marc B., 2005. Acculturation and Smoking Patterns Among Hispanics: A Review. *American Journal of Preventive Medicine*, 29(2), pp.143–148.
121. Bradman, A. et al., 2005. Association of Housing Disrepair Indicators with Cockroach and Rodent Infestations in a Cohort of Pregnant Latina Women and Their Children. *Enviromental Health Perspectives*, 113(12), pp.1795–1801.
122. Gentry, A.L. et al., 2007. Housing Quality Among North Carolina Farmworker Families. *Journal of Agricultural Safety and Health*, 13(3), pp.323–337.
123. Holden, C., 2001. Migrant health issues: housing. In *Migrant health issues monograph series*. Buda, TX: National Center for Farmworker Health.
124. Kasirye, O.C. et al., 2005. Acculturation and its association with health-risk behaviors in a rural Latina population. *Ethnicity & disease*, 15(4), pp.733–9.
125. Larson, A., 2001b. Environmental/Occupational Safety and Health: Housing. In *Migrant health issues monograph series no. 8*. Buda, TX: National Center for Farmworker Health. Available at: http://www.ncfh.org/docs/02%20-%20environment.pdf.
126. Larson, A., 1995. *An Assessment of Farmworker Housing in Yakima County, Washington*, Yakima, WA: The Housing Foundation.
127. Martin, P., 2006. Managing Labor Migration: Temporary Worker Programmes for the 21st Century. In *International Symposium on International Migration and Development*. Turin, Italy: International Institute for Labor Studies, Geneva. Available at: http://www.sedi.oas.org/ddse/migrantes/contenidos/Informaci%C3%B3n%20de%20apoyo/PMartin_UN_Jun2006.pdf.
128. Rye, J.F. & Andrzejewska, J., 2010. The structural disempowerment of Eastern European migrant farm workers in Norwegian agriculture. *Journal of Rural Studies*, 26(1), pp.41–51.
129. Sherman, J., Villarejo, D. & Garcia, A., 1997. *Finding Invisible Farm Workers: The Parlier Survey*, Davis, CA: California Institute for Rural Studies.
130. Vallejos, Q.M. et al., 2011. Migrant farmworkers' housing conditions across an agricultural season in North Carolina. *American Journal of Industrial Medicine*, 54(7), pp.533–544.
131. Basok, T., 2003b. Mexican Seasonal Migration to Canada and Development: A Community-based Comparison. *International Migration*, 41(2), pp.3–26.
132. Gordon, J., 2011. Free Movement and Equal Rights for Low-Wage Workers? What the United States Can Learn from the New EU Migration to Britain. *Fordham Law Legal Studies Research Paper*, No. 1864628. Available at: http://ssrn.com/paper=1864628.
133. Maclaren, B. & Lapointe, L., 2009. *Making a case for reform: Non-access to social security measures for migrant workers. Policy Paper*, Ottawa: Canadian Foundation for the Americas. Available at: http://www.focal.ca/pdf/migration_MacLaren-Lapointe_migrant%20workers%20non-access%20social%20security%20measures%20case%20for%20reform_October%202009.pdf.
134. Meggs, W. & Langley, R.., 1997. Chemical hazards of farming. In *Safety and Health in Agriculture, Forestry and Fisheries*. Rockville, MD: Government Institutes, Inc, pp. 249–265.
135. Mysyk, A., England, M. & Gallegos, J.A.A., 2009. A Case for Certified Interpreters for Participants in the Canada/Mexico Seasonal Agricultural Workers Program. *Human Organization*, 68(3), pp.318 – 327.

136. Seth, M.H., 2011. Structural Vulnerability and Hierarchies of Ethnicity and Citizenship on the Farm. *Medical Anthropology: Cross-Cultural Studies in Health and Illness*, 30(4), pp.425–449.
137. Wilk, V.A., 1988. *The occupational health of migrant seasonal farmworkers in the U.S.: progress report*, Washington, DC: Farmworkers Justice Fund.
138. Vosko, L.F., 2006. *Precarious employment: understanding labour market insecurity in Canada*, Québec: McGill-Queen's University Press.
139. Basok, T., 2000. He Came, He Saw, He Stayed. Guest Worker Programmes and the Issue of Non-Return. *International Migration*, 38(2), pp.215–238.
140. Borjas, G., Freeman, R.B. & Lang, K., 1991. Undocumented Mexican-born Workers in the United States: How Many, How Permanent? In *Immigration, Trade and Labour Market*. Chicago: University of Chicago Press, pp. 77–100.
141. Bosniak, L.S., 1991. Human Rights, State Sovereignty and the Protection of Undocumented Migrants under the International Migrant Workers Convention. *International Migration Review*, 25(4), pp.737–770.
142. Castles, S., 2004. The Factors that Make and Unmake Migration Policies. *International Migration Review*, 38(3), pp.852–884.
143. Chiswick, B., 1984. Illegal Aliens in the United States Labour Market: Analysis of Occupational Attainment and Earnings. *International Migration Review*, 18(3), p.714.
144. Chiswick, B., 1986. Illegal Aliens: A Preliminary Report on an Employee - Employer Survey. *The American Economic Review*, 76(2), p.253.
145. Chiswick, B., 1991. Speaking, Reading, and Earnings among Low-skilled Immigrants. *Journal of Labour Economics*, 9(2), p.149.
146. Hartman, T., 2008. States, markets, and other unexceptional communities: informal Romanian labour in a Spanish agricultural zone. *Journal of the Royal Anthropological Institute*, 14(3), pp.496–514.
147. Hess, S., 2006. The Demand for Seasonal Farm Labor from Central- and Eastern European Countries in German Agriculture. Available at: http://hdl.handle.net/1813/10581.
148. Markova, E.M., 2006. The Performance of Bulgarian Undocumented and Legalised Immigrants in the Spanish Labour Market.
149. Massey, D. et al., 1987. *Return to Aztlan: The Social Process of International Migration from Western Mexico*, Berkley: University of California Press.
150. Ramasamy, S. et al., 2008. The Recognised Seasonal Employer policy: Seeking the elusive triple wins for development through international migration. *Pacific Economic Bulletin*, 23(3), pp.171–186.
151. Repič, J., 2010. Migration, Informal Economy and Social Exclusion in Spain. *Studia ethnologica Croatica*, 22, pp.165–186.
152. Reyneri, E., 2003. Immigration and the Underground Economy in New Receiving South European Countries: Manifold Negative Effects, Manifold Deep-rooted Causes. *International Review of Sociology*, 13(1), pp.117–143.
153. Reyneri, E., 1998. The role of the underground economy in irregular migration to Italy: Cause or effect? *Journal of Ethnic and Migration Studies*, 24(2), pp.313–331.
154. Rivera-Batiz, F.L., 1999. Undocumented workers in the labor market: An analysis of the earnings of legal and illegal Mexican immigrants in the United States. *Journal of Population Economics*, 12(1), pp.91–116.
155. Schindlmayr, T., 2003. Sovereignty, Legal Regimes, and International Migration. *International Migration*, 41(2), pp.109–123.
156. Weil, P., 2002. Towards a Coherent Policy of Co–Development. *International Migration*, 40(3), pp.41–55.
157. Agudelo-Suarez, A. et al., 2009. Discrimination, work and health in immigrant populations in Spain. *Social Science & Medicine*, 68(10), pp.1866–1874.

158. Aguiar, L.L.M., 2006. Janitors and sweatshop citizenship in Canada. In *The dirty work of neoliberalism: Cleaners in the global economy*. Malden, MA: Blackwell, pp. 16–36.
159. Aguiar, L.L.M., 2004. Resisting Neoliberalism in Vancouver: An Uphill Struggle for Cleaners. *Social Justice*, 31(3), pp.105–129.
160. Aguiar, L.L.M., Tomic, P. & Trumper, R., 2011. *Mexican migrant agricultural workers and accommodations on farms in the Okanagan Valley, British Columbia*, Working Paper Series, Metropolis British Columbia, Centre of Excellence for Research on Immigration and Diversity. Available at: http://www.riim.metropolis.net/assets/uploads/files/wp/2011/WP11-04.pdf.
161. Arcury, T.A., Quandt, S. & Russell, G., 2002. Pesticide safety among farmworkers: Perceived risk and perceived control as factors reflecting environmental justice. *Environmental Health Perspectives*, 110(2), pp.233–240.
162. Atkinson, J., 1985. *Flexibility, uncertainty and manpower management*, Brighton: Institute of Manpower Studies, University of Sussex.
163. Barnetson, B., 2009. The regulatory exclusion of agricultural workers in Alberta. *Just Labour: A Canadian Journal of Work and Society*, 14, pp.50–74.
164. Binford, L., 2004. Contract labour in Canada and the United States: A critical appreciation of Tanya Basok's Tortillas and tomatoes: Transmigrant Mexican harvesters in Canada. *Canadian Journal of Latin American and Caribbean Studies*, 29(7/8), pp.289–308.
165. Butovsky, J. & Murray, E.G.S., 2007. Controversies / Controverses: The State of the Unions / L'etat des syndicats: Beyond Social Unionism: Farm Workers in Ontario and Some Lessons from Labour History. Available at: http://www.historycooperative.org/journals/llt/59/butovsky.html.
166. Choudry, A. et al., 2009. *Fight back: Workplace justice for immigrants*, Black Point, NS: Fernwood.
167. Cohen, R., 1987. *The new helots: Migrants in the international division of labour*, Brookfield, VT: Gower Publishing.
168. Geiger, M., 2008. Exclusion and inclusion of Moroccan migrants: Empirical evidences from Almeria, Spain. In *Migration, mobility and human rights at the eastern border of the European Union: space of freedom and security*. Timişoara: Editura Universităţii de Vest, pp. 217–238.
169. Hanson, C., Otero, G. & Preibisch, K., 2006. Working Conditions in British Columbia's Horticulture Industry: Contrasting Mexican and Indo-Canadian Workers. In *2006 Meetings of the Canadian Association for Latin American and Caribbean Studies*. Calgary, Alberta, Canada. Available at: http://meme.phpwebhosting.com/~migracion/rimd/documentos_miembros/Hanson_Otero_Preibisch-CALACS-2006.pdf.
170. Kasimis, C. & Papadopoulos, A.G., 2005. The multifunctional role of migrants in the Greek countryside: implications for the rural economy and society. *Journal of Ethnic and Migration Studies*, 31(1), pp.99–127.
171. Lyberaki, A., 2008. The Greek Immigration Experience Revisited. *Journal of Immigrant & Refugee Studies*, 6(1), pp.5–33.
172. Mendis, A.C.N., 2007. *The greenhouse tomato industry in Delta, British Columbia*. University of British Columbia, Vancouver, BC.
173. Norris, J., 2009. *North for the harvest: Mexican workers, growers, and the sugar beet industry*, St. Paul, MN: Minnesota Historical Society Press.
174. Preibisch, K., 2007. Local Produce, Foreign Labor: Labor Mobility Programs and Global Trade Competitiveness in Canada. *Rural Sociology,* 72(3), 418-449.
175. Preibisch, K. & Binford, L., 2007a. Interrogating Racialized Global Labour Supply: An Exploration of the Racial/National Replaceme of Foreign Agricultural Workers in Canada. *Canadian Review of Sociology/Revue canadienne de sociologie*, 44(1), pp.5–36.

176. Sole, C. and Parella, S., 2003. The labour market and racial discrimination in Spain. *Journal of Ethnic and Migration Studies,* 29(1), 121-140.
177. Stilz, A., 2010. Guestworkers and second-class citizenship. *Policy and Society*, 29(4), pp.295–307.
178. Tomic, P., Trumper, R. & Aguiar, L.L.M., 2010. Housing regulations and the living conditions of Mexican migrant workers in the Okanagan Valley, British Columbia. *Canadian Issues/Thèmes Canadiens*, (Spring), pp.78–82.
179. Walia, H., 2010. Transient servitude: migrant labour in Canada and the apartheid of citizenship. *Race & Class*, 52(1), pp.71–84.
180. Basok, T., 2009. Counter-hegemonic Human Rights Discourses and Migrant Rights Activism in the US and Canada. *International Journal of Comparative Sociology*, 50(2), pp.183–205.
181. Benson, P., 2008. El Campo: Faciality and Structural Violence in Farm Labor Camps. *Cultural Anthropology*, 23(4), pp.589–629.
182. Binford, L., 2009. From Fields of Power to Fields of Sweat: the dual process of constructing temporary migrant labour in Mexico and Canada. *Third World Quarterly*, 30(3), pp.503–517.
183. Binford, L., 2002. Social and Economic Contradictions of Rural Migrant Contract Labor Between Tlaxcala, Mexico and Canada. *Culture & Agriculture*, 24(2), pp.1–19.
184. Calavita, K., 2003. The dialectics of immigrant "integration" and marginality in industrialising America and post-industrial Europe. *Transfer: European Review of Labour and Research*, 9(3), pp.416–431.
185. CRC, 2007. *A8 Migrant Workers in Rural Areas*, Briefing Paper. Commission for Rural Communities, London.
186. Emerson, R.D., 2007. Agricultural Labor Markets and Immigration. *American Agricultural Economics Association*, 22(1), pp.57–66.
187. Friedland, W.. & Nelkin, D., 1971. *Migrant Agricultural Workers in America's Northeast*, New York: Holt, Rinehart and Winston.
188. Goldfarb, R.L., 1981. *A Caste in Despair: Migrant Farm Workers*, Ames: Iowa State University.
189. Gowricharn, R., 2002. Integration and social cohesion: the case of the Netherlands. *Journal of Ethnic and Migration Studies*, 28, pp.259–273.
190. Griffith, D. & Kissam, E., 1994. *Working Poor: Farmworkers in the United States*, Philadelphia: Temple University Press.
191. Hoggart, K. & Mendoza, C., 1999. African Immigrant Workers in Spanish Agriculture. *Sociologia Ruralis*, 39(4), pp.538–562.
192. Jentsch, B., 2007. Migrant integration in rural and urban areas of new settlement countries: thematic introduction. *International Journal on Multicultural Societies*, 9, pp.1–12.
193. Jentsch, B., De Lima, P. & MacDonald, B., 2007. Migrant workers in rural Scotland: "going to the middle of nowhere." *International Journal on Multicultural Societies*, 9, pp.35–53.
194. Kasimis, C., Papadopoulos, A.G. & Zacopoulou, E., 2003. Migrants in Rural Greece. *Sociologia Ruralis*, 43(2), pp.167–184.
195. King, R., 2000. Southern Europe in the changing global map of migration. In *Eldorado or Fortress? Migration in Southern Europe*. London: MacMillan, pp. 1–26.
196. Massey, D. & Liang, Z., 1989. The long-term consequences of a temporary worker program: The US Bracero experience. *Population Research and Policy Review*, 8(3), pp.199–226.
197. Mize, R.L., 2006. Mexican Contract Workers and the U.S. Capitalist Agricultural Labor Process: The Formative Era, 1942–1964. *Rural Sociology*, 71(1), pp.85–108.
198. Oxfam America, 2004. *Like Machines in the Field: Workers without Rights in American Agriculture*, Boston: Oxfam America.

199. Palacios, S.P.I. et al., 2009. The Social Situation of Immigrant Farm Workers : A Comparative Study between Spain and the U.S. *The Nōkei Ronsō : The Review of Agricultural Economics, Hokkaido University*, 64, pp.153–168.
200. Rogaly, B., 2008a. Intensification of workplace regimes in British horticulture: the role of migrant workers. *Population, Space and Place*, 14(6), pp.497–510.
201. Rogaly, B., 2008b. Migrant Workers in the ILO's Global Alliance Against Forced Labour Report: a critical appraisal. *Third World Quarterly*, 29(7), pp.1431–1447.
202. Smith-Nonini, S., 1999. *Uprooting Injustice: A Report on Working Conditions for North Carolina Farmworkers and the Farm Labor Organizing Committee's Mt. Olive Initiative*, Durham, NC: Institute for Southern Studies.
203. Thompson, C.D. & Wiggins, M.F., 2002. *The Human Cost of Food: Farmworkers' Lives, Labor , and Advocacy*, Austin: University of Texas Press.
204. Ubaldo Martínez, V., 1998. Immigrants in the Spanish Labour Market. *South European Society and Politics*, 3(3), pp.105–128.
205. Villarejo, D., 2003. The health of U.S. hired farm workers. *Annual Review of Public Health*, 24(1), pp.175–193.
206. Wells, M., 1996. *Strawberry Fields. Politics, Class, and Work in California Agriculture*, Ithaca: Cornell University Press.
207. Arcury, T.A. et al., 1999. Implementation of EPA's Worker Protection Standard training for agricultural laborers: an evaluation using North Carolina data. *Public Health Reports*, 114(5), pp.459–468.
208. Arcury, T.A., Quandt, Sara. A & McCauley, L., 2000. Farmworkers and pesticides: community-based research. *Environmental Health Perspectives*, 108(8), pp.787–792.
209. Arcury, T.A., Quandt, Sara A., et al., 2001a. Farmworker reports of pesticide safety and sanitation in the work environment. *American Journal of Industrial Medicine*, 39(5), pp.487–498.
210. Arcury, T.A., Quandt, Sara A, et al., 2001b. Pesticide Use and Safety Training in Mexico: The Experience of Farmworkers Employed in North Carolina. *Human Organization*, 60(1), pp.56 – 66.
211. Arcury, T.A., Quandt, S. & Russell, G., 2002. Pesticide safety among farmworkers: Perceived risk and perceived control as factors reflecting environmental justice. *Environmental Health Perspectives*, 110(2), pp.233–240.
212. Arcury, T.A., Estrada, J.M. & Quandt, Sara A, 2010. Overcoming Language and Literacy Barriers in Safety and Health Training of Agricultural Workers. *Journal of Agromedicine*, 15(3), pp.236–248.
213. Austin, Colin et al., 2001. Training Farmworkers About Pesticide Safety: Issues of Control. *Journal of Health Care for the Poor and Underserved*, 12(2), pp.236–249.
214. Azaroff, L.S., Levenstein, C. & Wegman, D.H., 2002. Occupational Injury and Illness Surveillance: Conceptual Filters Explain Underreporting. *American Journal of Public Health*, 92(9), pp.1421–1429.
215. Braaten, A.W., 1996. *Guidelines for safely laundering pesticide-contaminated clothing*, Fargo: North Dakota University of Agriculture and applied Science. Available at: http://library.ndsu.edu/tools/dspace/load/?file=/repository/bitstream/handle/10365/6396/HE382_1996.pdf?sequence=1.
216. Buhler, W.G. et al., 2007. Violations of pesticide use and worker safety regulations in Noth Carolina. *Journal of Agricultural Safety and Health*, 13(2), pp.189–203.
217. Burke, M.J. et al., 2006. Relative Effectiveness of Worker Safety and Health Training Methods. *Am J Public Health*, 96(2), pp.315–324.
218. Columbia Legal Services, 1998. *Enforcement of Farm Worker Pesticide Protection in Washington State*, Seattle, WA: Columbia Legal Services.
219. Davis, J.U., Caswell, J.A. & Harper, C.R., 1992. Incentives for Protecting Farm Workers from Pesticides. *American Journal of Agricultural Economics*, 74(4), pp.907–917.

220. Davis, S. & Schleifer, R., 1998. *Indifference to Safety: Florida's Investigation into Pesticide Poisoning of Farmworkers*, Belle Glade, FL: Migrant Farmworker Justice Project.
221. Earle-Richardson, G., May, J. J & Ivory, J.., 1998. Planning study of migrant and seasonal farmworkers in New York State: understanding the occupational safety environment using focus groups. *Journal of Agricultural Safety and Health*, Special Issue(1), pp.111–119.
222. Larson, A., 2000. *An Assessment of Worker Training under the Worker Protection Standard Final Report*, Vashon Island, WA.
223. Liebman, A. & Augustave, W., 2010. Agricultural Health and Safety: Incorporating the Worker Perspective. *Journal of Agromedicine*, 15(3), pp.192–199.
224. Mayer, B., Flocks, J. & Monaghan, P., 2010. The role of employers and supervisors in promoting pesticide safety behavior among florida farmworkers. *American Journal of Industrial Medicine*, 53(8), pp.814–824.
225. McCauley, L. et al., 2001. The Oregon migrant farmworker community: an evolving model for participatory research. *Environmental Health Perspectives*, 109(3), pp.449–455.
226. Perry, S. & DiFonzo, C., 1998. *The Worker Pesticide Knowledge Survey: Measuring Success of Worker Protection Standard Pesticide Safety Training*, Lansing, MI: Michigan Department of Agriculture.
227. Pratt, D.S. et al., 1992. The dangers of dairy farming: The injury experience of 600 workers followed for two years. *American Journal of Industrial Medicine*, 21(5), pp.637–650.
228. Quandt, Sara A et al., 2001. Preventing occupational exposure to pesticides: Using participatory research with Latino farmworkers to develop an intervention. *Journal of Immigrant Health*, 3, pp.85 – 96.
229. Sorensen, J.A. et al., 2008. Encouraging farmers to retrofit tractors: a qualitative analysis of risk perceptions among a group of high-risk farmers in New York. *Journal of Agricultural Safety and Health*, 14(1), pp.105–117.
230. Strong, L.L. et al., 2008. Factors associated with pesticide safety practices in farmworkers. *American Journal of Industrial Medicine*, 51(1), pp.69–81.
231. Weinger, M. & Lyons, M., 1992. Problem-solving in the fields: an action-oriented approach to farmworker education about pesticides. *American Journal of Industrial Medicine*, 22, pp.677–690.
232. Whalley, L.E. et al., 2009. Migrant Farmworker Field and Camp Safety and Sanitation in Eastern North Carolina. *Journal of Agromedicine*, 14(4), pp.421–436.
233. Gabriel, C. & Macdonald, L., 2011. Citizenship at the Margins: The Canadian Seasonal Agricultural Worker Program and Civil Society Advocacy. *Politics & Policy*, 39(1), pp.45–67.
234. GCIM, 2005. *Migration in an interconnected world: New directions for action*, Global Commission on International Migration. Available at: http://iom.int/jahia/webdav/site/myjahiasite/shared/shared/mainsite/policy_and_research/gcim/GCIM_Report_Complete.pdf.
235. Lopez, M.P., 2011. Immigration Law Spanish- Style II: A Study of Spain's Voluntary Immigrant Return Plan and Circular Migration. *Temple International and Comparative Law Journal*, 24. Available at: http://works.bepress.com/maria_lopez/3.
236. Martin, P., 2007. Managing Labor Migration in the 21st Century. *City & Society*, 19(1), pp.5–18.
237. Reed, A. J., 2008. Canada's experience with managed migration : The strategic use of temporary foreign worker programs. *International Journal*, 469-484.