

Health care and exposure to pesticides in periurban horticulture: the case of the Green Belt of the City of Cordoba, Argentina

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Abstract *This article aims to analyze health care and exposure to pesticides within the context of productive and reproductive practices or the everyday life of horticulturists in the Green Belt of the City of Cordoba (GBCC), Argentina, from the individual, particular and general domains as the comprehensive framework of health determining processes. An explanatory analytical study was implemented which included the use of mixed methodologies between 2013 and 2017. A triangulation analysis was carried out of the results of the quantitative and qualitative aspects. It was observed that the dominant agricultural productive model has determined the deterioration of the productive conditions and exposure to pesticides of the horticultural population of the GBCC. Deficient systems for regulating land use, weak legislation and control from the State in accordance with the context impact on everyday life and block the horticulturists' individual health protection practices.*

Key words *Social health determinants, Pesticides, Agricultural production, Urban agriculture, Ecological corridor*

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Introduction

A country with centenarian farming traditions, Argentina has a wide range of geographical and territorial conditions for agricultural production which have encouraged differentiated processes of social construction within the sector. At present horticulture covers approximately 700,000 ha¹ and engages nearly 10 thousand workers a year, thus making it a highly valuable social activity². The large urban centers – Buenos Aires, Mendoza and Cordoba – concentrate half of the total volume produced. The horticultural sector does not escape from the Dominant Agricultural Productive Model (DAPM), characterized by intensive primary exploitation as to factors relating to tilling the soil, work, capital and technology³. Compared with the remainder of the farming sector, it requires 30 times more labor in its entirety and 20 times more consumables per production unit, among them pesticides⁴.

The problem this work focuses on is located in the space immediately adjacent to the physical environment where cities are established, the productive, residential and service territory, the so-called *periurban* area⁵. In Argentina, this periurban space is called the “green belt” (GB) and is made up of family-run truck farms or market gardens, or others of more corporate characteristics. The multiple threats jeopardizing this space question public agendas as it constitutes the seat of these cities’ food replenishing systems⁶. The origin of periurban horticulture in the country was marked by its family nature and the migrant condition of the producer families: families originating from Italy, Portugal and Spain in the early 20th century and then from Bolivia at the end of the last and beginning of this century. Currently 60% of the GB in the country is sustained by Bolivian families⁷. Changes in the configuration of the exploitation were accompanied by transformations in the ownership and use of the land, where small and large landowners, lessees, sharecroppers and employees can all be identified⁸. Sharecropping is a figure in the agrarian sector (Law 13,246) in which the producer, the landowner, organizes the production process within his property using work force provided by way of direct access to resources for its production, accommodation, food, etc., an arrangement that enables, naturalizes and legitimates certain oppressive labor relations and precarious working conditions⁹.

Among the particularities this horticultural sector acquires are the invisibility of the work-

ers, legal loopholes in the sector, scarce knowledge of effective regulations, poor dissemination, discussion and nonperformance, low presence of unions and the State in its role as auditor, reasons which determine the existing job insecurity and facilitate exploitation¹⁰. Added to this, the imperceptibility that characterizes the activities in which family farming is prevalent¹¹. The fact that they are migrants also increases the risk of diseases, environmental and occupational lesions, as well as health disparities typically associated with poverty¹².

The Green Belt of the City of Cordoba (GBCC) contributes 16% of the country’s production and is third in regard to the total volume produced, with a surface area covering some 5,500 ha of productive land. The unplanned urbanization model, established by the liberal economic model that proposed the elimination of export taxes, import duties on capital goods and a series of public agencies regulating the sector, along with the introduction of a modern biotechnological package, RR and glyphosate resistant soybean¹³ has favored, among other things, a reduction to half of its size in less than 20 years. The advance of urban boundaries and the extensive farming of soybean, as well as the lack of water for irrigation on account of the reallocation of existing canals towards new gated communities, have been identified as the main reasons for the displacement of truck farms to nearby districts¹⁴. Most *horticultural families* (HF) live on the farm where the crops are located and where they lead their everyday lives¹⁵, where the family members take part in different aspects of the production process¹⁶. Men, women and children work on the farm, where the work of the latter appears concealed under the label of “help”¹⁷.

The workers’ and families’ exposure to pesticides must be considered with special attention given how the work is organized, as it brings together and intertwines productive and reproductive aspects^{18,19} with very little control from the horticulturists as to the safety conditions of their work¹². The scenarios in which exposure to pesticides occurs depend largely on the favorable or negative conditions of the social and cultural situation in which they develop²⁰.

Epidemiological studies that have addressed the problem of exposure to pesticides in rural environments claim that the effects on human health are associated to a diversity of factors: the type of pesticide and its toxicity, the dose, the technology with which it is applied, the duration and the meteorological conditions during expo-

sure, the channels through which it occurs, the characteristics of the subjects themselves, the use of measures of protection and the modes of organization of the labor environment^{21,22}. Hence it is claimed that the ailments and illnesses suffered by the horticulturists (handlers of pesticides) are a result of uncontrolled exposure to such substances, identified as risk factors that are preventable by implementing good farming practices. This epidemiological perspective, centered on identifying risk factors of an individual level, disregards the determination processes implicit in the productive structure. The reasoning conceals the restrictive frameworks faced by these people and communities in protecting themselves from destructive processes, that is to say, “*in modifying their lifestyles*.” These risk factors, resignified by the contribution of several authors from the field of collective health, could be considered links in the productive chain in the DAPM context^{23,24}. It is relevant here to incorporate the concept of *comprehensiveness of care*²⁵ as it allows us to reflect upon the sociocultural senses and practices that determine particular forms of caring for oneself, conceptions of health, risk, disease prevention and health promotion, among others. All of them come into play from the standpoint of health professionals and institutions, and in the communities themselves, facilitating or hindering such care practices. Thus exposure is no longer considered in an isolated manner or as a simple “contingency”: it is part of a pattern of intoxication which in turn acquires its form and epidemiological impact in the midst of a group lifestyle.

In understanding health as a complex and socially determined process²⁶, it has been posed that there is a dialectic movement between simple and complex, individual and collective dimensions²⁰, which may be identified. In this paper we adopt the proposal put forward by Castellanos²⁴ regarding three dimensions of analysis. The *General Dimension* (GD) which represents the expression of a society’s mode of life, its productive forces, economic and political organization, forms of relating with the environment, its culture and its history. The community’s life conditions, the *Particular Dimension* (PD), comprises 4 processes of social reproduction of everyday life: a) biological processes; b) those of relationships and ecological processes; c) those of the forms of awareness and conduct; d) those of economic relationships. The *Singular Dimension* (SD), meanwhile, is the expression of people’s individual ways of life and behaviors, family lifestyles and forms of

existence²⁴. Following this comprehensive model, the aim of this work was to analyze the determining processes of health care and exposure to pesticides within the context of productive and reproductive practices of the everyday lives of the horticulturists of the GBCC.

Material and methods

An explanatory analytical study was implemented which included the use of mixed methodologies. To do so, a triangulation analysis was carried out of the results of the quantitative and qualitative aspects²⁷. Using the quantitative approach, a survey of horticultural workers was conducted, adapted to the context of the GBCC in stages prior to this research¹⁶. A representative sample was drawn of the population of workers/producers in the GBCC with a confidence level of 95% (n=143). This stage was conducted between 2013 and 2017. The instrument applied has four modules, which address the following information: a) *sociodemographic characteristics* (age, educational attainment, marital status, type of family, nationality); b) *production practices and work with pesticides* (application techniques, number of hours a day devoted to work, use of personal protective equipment); c) *everyday life* (labor category, seniority in the job, size of the farm, number of hectares tilled, number of days per week devoted to work, participation of family members in farm labor, expressed as family work, place of residence); d) *the worker and his family’s health conditions* (associated symptomatology, medical consultations, accidents with pesticides). Variables from the first three modules were selected for this work. Descriptive analyses were made (average and SD for quantitative variables, description of frequency of categories of qualitative variables) and a logistical regression analysis.

The qualitative inquiry consisted of holding semi-structured interviews with key players (n=27) who were contacted following the “snowball” technique²⁸: 17 members of HFs, 1 official from the Ministry of Agriculture, 2 phytosanitary advisors, 1 union contact person and 6 health professionals involved in the domain of the GBCC. Participant and non participant observation and field records were carried out in: farms, the city wholesale food market, meetings with horticulturists along with civil society and State agencies. After transcribing and reading the interviews, fragments were identified that made it possible to characterize the different dimensions

of interest, resorting to the “grounded theory” to analyze the data²⁹. By triangulating the data, an interpretative framework was built as from the categories described in Figure 1 (adapted from Castellanos²⁴). This research was approved by the Ethics Committee of the School of Medical Sciences of the National University of Cordoba (148/12); the principles inherent to the declarations of Nuremberg, Helsinki and Tokyo were safeguarded. The data were preserved according to the principle of *habeas data*.

Results

General Dimension as an expression of modes of life in the GBCC

The GBCC is currently configured as a space of transition between the urban and the rural, where productive and reproductive activities of the HFs merge, with no demarcated geographical barriers. The scenery beyond the ring road, a fast circulation ring envisioned as a belt to limit the city’s growth³⁰, appears in Cordoba as a mixture of neighborhoods inserted in the areas with crops destined to horticulture, schools, companies and a variety of industries. Ancestral and community forms of agriculture connected with nature

have been replaced by practices which respond to the DAPM: “(...) The important thing here is to produce more and more, we can’t take risks (...)” (Horticulturist, 50 years of age). The model is further pushed by companies that provide production consumables, seeds, fertilizers and pesticides, and which “invest” in training programs that promote their benefits. Precarious labor relations have been identified (unregistered temporary work, long working days, scarce hygiene and job security), phenomena which characterize the DAPM. “(...) I used to be an employee, now I’m a sharecropper, and for it to be worthwhile I have to work all day, (...) sometimes all my family have to come and lend a hand (...)” (Horticulturist, 39 years of age).

Within the context of an intense struggle for land use and access to irrigation, and faced with a lack of legislation to regulate the periurban area and protect horticultural zones, the horticulturists begin moving to neighboring districts or simply selling their farms: “(...) we’ve been in Rio Segundo for 6 years, but we were pushed out by the prices of productive land (...)” (Horticulturist, 32 years of age). A phenomenon that is appearing incipiently is the social pressure generated by the use of pesticides on land adjacent to urban centers; in view of this, agroecological production is emerging and establishing itself as

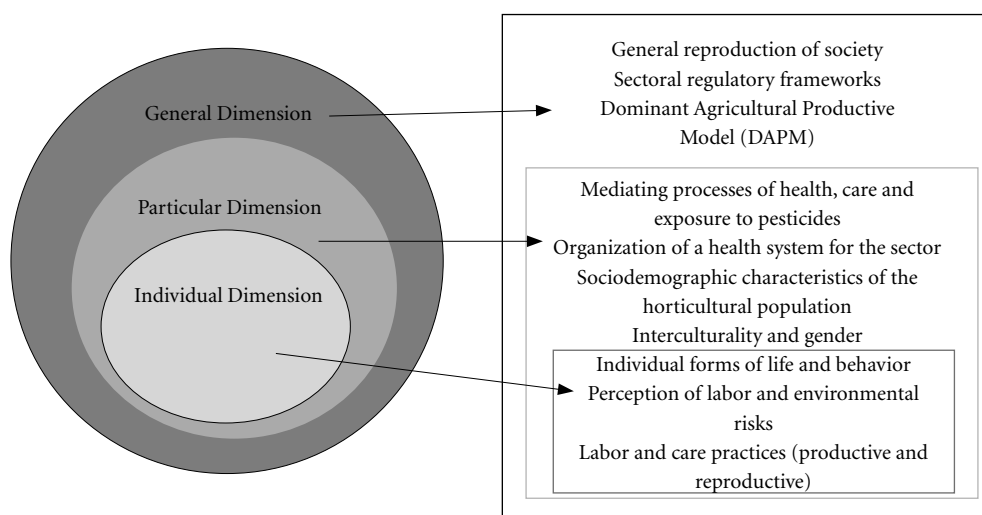


Figure 1. Description of the model used to determine the health of the horticulturists of the GBCC.

Source: Adaptation to the context of the GBCC as per Castellanos²⁴.

a way of remaining in an area in the face of urban encroachment.

The use of pesticides in agriculture is regulated in Cordoba by Law 9,164; among the productive community of the GBCC there is little knowledge relating to its content and/or usefulness, even among farming professionals who by law are in charge of conducting phytosanitary prescriptions and advising on the use of pesticides: "(...) The law has to be interpreted, parts of it aren't clear (...)" (Phytosanitary advisor, 30 years of age). Among some sectors there are also players who express the need to have a specific legal instrument for horticultural production on account of its characteristic differences with other agricultural exploitations for which the law in force was designed; health professionals see loopholes and regulatory inconsistencies related to the health needs of workers exposed to pesticides and those communities in the adjacencies. Thus regulatory loopholes and lack of control in current regulations restrict effective health care actions for the population.

Particular Dimension as an expression of everyday life in the GBCC

The sociodemographic characteristics of the population of workers is shown in Table 1. The average age is 43.6 years [SD 13.16], 69.23% are over 35 years of age, the majority have completed only the lower schooling levels (complete primary or less, 55.24%) and live with their families (74.82%). Interculturality is a particular characteristic that permeates these families' daily lives, as 33.1% of the HFs are Bolivian. The Argentine families are children and grandchildren of Spaniards and Portuguese who arrived at the beginning of last century, inherited the land, the activity and their housing: "(...) I've done this all my life, my father and grandfather began with it (...)" (Horticulturist, 42); and on the other hand Bolivian families who migrated here during the last few decades: "(...) first my husband came, then the rest of us, and we stayed (...)" (Horticulturist, 45 years of age). Some of the Bolivian HFs that arrived in the the GBCC to work as employees two decades ago today own the land they till. The family culture determines the differentiated forms of production, which reflect the allocation of roles to family members. The work done by Bolivian women on the farm is recognized. Among Argentine families, the woman's participation in the productive tasks is dubbed "help", thus rendering their economic contri-

Table 1. Sociodemographic characteristics of horticultural workers in the GBCC. Argentina. 2013-2017.

Sociodemographic Characteristics	N	% ^a
Age, years (mean±SD)		
n=143	43.60	(13.16)
≥ 25	17	11.89
> 25-<35	27	18.88
≥ 35-<45	29	20.28
≥ 45-<55	37	25.87
≥ 55	33	23.08
Total	143	100
Educational Attainment		
Complete primary or less	79	55.24
Incomplete secondary	44	30.77
Complete secondary or more	20	13.99
Total	143	100
Marital status		
Married/cohabiting	104	74.82
Separated/single	37	25.18
Total	140	100
Type of family		
Nuclear family ^b	76	56.3
Nationality		
Argentine	95	66.90
Bolivian	47	33.10
Total	142	100

^aPercentage considering the total number of valid responses;

^bOnly positive responses are expressed.

Source: Prepared by the authors.

bution to the production process invisible. For all of them, work on the farm permeates their everyday life, determining the exposure to pesticides. "(...) the family works and the children come and go, sometimes curing, and the children follow their parents and hang around near them" (Horticulturist's wife, who does not define herself as a horticulturist, 39 years of age). The spaces shared in marketing the products are also used for socialization and recreation, the horticulturists exchange vegetables cooperatively and gather around for meals. Bolivian families bond with each other and strengthen the recreational encounters outside of their production and sales locations. The *Pasanaku* strategy, described as a recreational game, makes it possible to purchase personal and immovable property cooperatively favoring growth and permanence in the sector.

A description of its context is shown in Table 2. With respect to the labor condition according to their connection with the means of production, we find them as *owners* (42.14%) of the

land and the production tools, *lessees* (40.71%) who rent the land and contribute the means of production, *sharecroppers* (8.57%) and *employees* (8.57%), to whom specific tasks such as sowing, harvesting, hoeing, etc. are allocated. In the sector, 70% of the farms are classified as small or medium sized. On farms of 10 hectares or less, several family members take part in the productive tasks: "(...) Unless we all work the land, it's not worth it; the land is small and not enough to justify hiring employees... We are working in the greenhouse at the moment" (Horticulturist, 50 years of age). The landscape is uniform and indistinct between the places where: "we work" and "we live." Women and children do activities on the farm. They often do farm work five days a

week or more, and more than five hours a day on average, except when they apply pesticides: "I do everything except curing, which my husband always does. He says he knows about that... well, so do I, but he doesn't let me..." (Horticulturist, 45 years of age). Some 89.09% of them work more than 5 days a week and when the family lives on the farm, women and children work as so-called "help" (48.15%). Everyday life revolves around intense, routine work with virtually no rest.

The members of the horticultural community interviewed generally define this kind of life and work environment as healthy: "I don't think living here is bad for the health... Look, everything's green, beautiful, and it was even more beautiful before (...)" (Horticulturist, 55). They perceive the use of pesticides in their everyday life as something dangerous or slightly dangerous and they consider that the products nowadays are "milder" than those their parents or grandparents used to use. The occurrence of serious health conditions among close family members, however, has generated changes in their perception of the risk.

The healthcare workers serving in the GBCC lack specific health records related to exposure.

Individual dimension of the labor practices with pesticides in everyday life

Table 3 expresses the characterization variables of the practices with pesticides. The predominant pesticide application technique is using a manual backpack (80%) and 38.8% do it for more than 4 hours a day on the day the sprinkling is carried out. Most of the horticulturists do not wear Personal Protective Equipment (PPE) effectively to prevent exposure during application. The multidimensional approach selected in this study has made it possible to look beyond the immediate circumstances of the horticultural workers and their families. There is evidence of a relationship between the lifestyle and the particular forms of pesticide exposure, as well as connections between these forms of exposure and with the immediate events of their lives and working conditions. Table 4 presents how the lack of care after pesticide application ($p=0.039$) and the fact of living on the farm ($p=0.57$) increase the chances of accidents. The jobs identified on the farm (sowing, curing or applying pesticides, a term in common usage in the sector, hoeing, harvesting, packaging) by the family members are defined according to how hazardous they are perceived. Those that represent the greatest "risk,"

Table 2. Description of the context of the horticultural workers' everyday life in the GBCC, Argentina, 2013-2017.

Life context	Absolute frequency	% ^a
Labor category		
Owner	59	42.14
Lessee	57	40.71
Sharecropper	12	8.57
Employee	12	8.57
Total	143	100
Seniority in the job (years)		
≤ 5	19	13.29
> 5 and ≤15	31	21.68
> 15 and ≤25	32	22.38
> 25	61	42.66
Total	143	100
Weekly work (days)		
< 5	12	9.91
≥ 5	119	89.08
Total	131	100
Family work ^b		
Yes	65	48.15
Total	135	
Living on the farm ^b		
Yes	68	48.57
Total	140	
Hectares tilled		
≤ 10	86	60.5
> 11 to ≤ 40	42	30
> 40	15	9.5
Total	143	100

^aPercentage considering the total number of valid responses;

^bOnly positive responses are expressed.

Source: Prepared by the authors.

such as applying pesticides (“curing” is the term used by the horticulturists), are carried out by the man. The weight of the backpack and poisonous spills on the body are recognized as the greatest exposure situations. The former determines that health care is the worker’s individual responsibility, and is achieved exclusively by the use of PPE. Lack of time, discomfort and the cost of PPE are identified as impediments to their use: “But let’s get real, no one will use it (...) I’ll take you right away to all the farms there are in Villa Retiro (...).”

Table 3. Characterization of pesticide practices of horticultural workers in the GBCC, Argentina. 2013-2017.

Practices with pesticides	Absolute frequency	% ^a
Pesticide application technique		
With a Backpack ^b	114	80
Total	142	
Work hours a day with pesticides		
≤ 3	63	61.17
4 to ≤ 7	25	24.27
≥ 8	15	14.56
Total	103	
Use of PPE n=139		
≤ 80% (not protected)	85	61.17
≥ 80% (protected)	54	38.83
Total	139	

^aPercentage considering the total number of valid responses;

^bOnly positive responses are expressed.

Source: Prepared by the authors.

(Horticulturist, 38 years of age). Triple washing of pesticide containers and adequately dispensing with them is hindered by the absence of any selective collection thereof. Burning and burying are habitual, even though these practices are forbidden by current legislation. Within the household, pesticide residue is circulated by way of the horticulturists’ footwear and working clothes and by drift from nearby crops, these being clear expressions of the invisibility of these spaces. Women moderate exposure by sustaining different healthcare practices: “Sometimes he changes there (in the farm) and others he comes in his working clothes (...); I’ve struggled against that... Him lying on the bed in his working clothes... it’s a struggle (...) (Horticulturist, 40 years of age). As for the role of the State as the guarantor of individual rights connected to health, a lack of information necessary for the correct handling of pesticides was evidenced by the subjects involved in using them. The workers fail to understand the existing regulations for their use as they consider they do not adapt to horticultural production conditions, thus resulting in an impediment for the healthcare of the horticulturists and their families. “(...) Those who work in these activities only come to consultations if the situation is serious and we don’t see them in the health center.” (Health professional).

Discussion

The purpose of this work has been to shed light on the dialectic movement produced between the different health determination domains in the GBCC related to the prevalent productive

Table 4. Estimates of measures of association (OR), their confidence intervals (CI) and p-value for the occurrence of accidents with pesticides, obtained from the multiple logistics regression model in a study of horticultural workers of the GBCC.

Variables	Categorías	OR	IC95%	Valor P
Level of protection (use of PPE)	80% or >	Ref.	---	---
	<than 80%	0.95	0.25-3.58	0.944
Living on the farm	No	Ref.	---	---
	Yes	5	0.95-26.3	0.057
Care regarding spills	Washes immediately after work	Ref.	---	---
	Washes at the end of the work day	4.27	1.07-16.09	0.039
	Does not wash	2.74	0.20-37.43	0.449
Nationality	Argentine	Ref.	---	---
	Bolivian	0.316	0.06-1.46	0.141

Source: prepared by the authors.

model, health care and exposure to pesticides, which gain actuality in the individual and family health conditions of the people living and working within this context. The adoption of a multidimensional viewpoint and a comprehensive representation of the general, particular and individual processes makes it possible to visualize the health process as essentially contradictory, as all three of these dimensions are determined by negative phenomena that affect life and health patterns and by processes of protection and collective and individual support that promote health and prolong life²⁰.

The DAPM that promotes the current production context in the GBCC has triggered changes in the productive structure centered on corporate logic, determining alterations in the life patterns of horticultural families. The productive transformations which initiated over three decades ago in the GBCC, with an increase in the use of pesticides as the central aspect of the production process, have produced socioenvironmental impacts. Potential negative effects on human health are described in Argentina^{16,17,31-34}, the dispossession of productive land^{14,35,36} and the deterioration of productive conditions³⁷; the loss of nutrients from the soil³⁸ and the reduction of local and regional dietary quality³⁹. The effects on the workers' health become visible in other Latin American contexts: health risks in Brazil are evidenced by rural workers in Soares and Porto, as well as the cost generated by intoxications⁴⁰, while Delgado and Paumgarten⁴¹ reveal exposure to pesticides due to lack of individual protection while handling pesticides in 92% of workers. Existing evidence makes it possible to postulate that the social/economic costs associated to this productive model could be reduced by implementing public policies aimed at promoting other forms of production⁴².

In agreement with Giarracca and Teubal^{37,43}, the DAPM has determined the deterioration of the productive conditions and exposure to pesticides of the horticultural population of the GBCC. Growing dissemination of wage labor and loss of job stability in rural employment, deficient regulation, control, sanitation and education by the State with respect to the use of pesticides^{44,45} accompany this model, which impacts on the environmental, social and human spheres, resulting in an extremely vulnerable population with a high level of exposure to pesticides^{16,17,46}. All this in a context where the provincial legislation admits legal loopholes that fail to guarantee health care.

The approach made to the particular dimension highlights the fact that the everyday practices displayed by horticulturists in the productive and reproductive environment in relation to exposure to pesticides respond to a socially construed signification of risk²⁰, which helps to understand how exposure conditions are reproduced in the most individual lifestyles: the individual dimension. As Foucault points out⁴⁷, the notion of self-care is incorporated by the relationship established not just with one's own body but also with others and with the environment. Thus viewed, individual health facts such as the disorders and diseases that characterize horticultural workers and their families are part of collective health processes. Similarly, this dialectic movement gives way to aspects of protection, support and defenses that are closely related to the transformation of the health situation, which tends to reproduce itself in other collectives²⁴.

The current productive model constitutes a threat to the Argentine population's safety and dietary sovereignty⁴⁸. On one hand, we have the problem of sovereignty and on the other Argentina's safety in guaranteeing food in sufficient quantity and diversity to meet the needs of its own population. Despite the hegemonic and excluding evolution of the DAPM, experiences have emerged that confront it and even dispute its prevalence. There are several tendencies within this paradigm that deserve to be identified even though they are often concealed. One of them is organic or ecological agriculture which is identified nowadays as a palliative and a potential improvement for environmental health. The analysis of exposure to pesticides and the care required in the context of the life and work of horticulturists, through the general, particular and individual categories, has made it possible to point to the fact that the DAPM modulates the everyday life of horticultural workers, their families and the communities they interact with, due either to the proximity of the farms or to being considered consumers of the production, generating a direct impact on health.

This form of production is considered irrational and, with respect to this, there are some technical solutions that deserve to be applied (Good Agricultural Practices, for example). Nevertheless, it is imperative to discuss the aims of the model, its reasonableness. In this sense, we present what Hardin⁴⁹ calls a problem with no technical solution. That is to say, it is perhaps harder but no less fruitless to admit the existence of a political and ethical problem and, as a result,

seek solutions or, at least, advance in this sense beyond the technical solutions that fail to address the fundamental problem, the model's (un)sustainability and its consequences in terms of caring for health and the environment.

Collaborations

MA Eandi developed the original idea and the writing of the first draft of the manuscript. M Butinof contributed to the idea and design of the study, participated in the writing and correction of the manuscript. L Dezotti participated in data analysis and writing.

References

- Mitidieri MS. *Programa Nacional Hortalizas, Flores y Aromáticas. Plan de Gestión Integrador PNHFA 1106081. Contribución al desarrollo territorial de las producciones intensivas*. San Pedro: INTA; 2015.
- Bocero S, Prado P. Horticultura y territorio. Configuraciones territoriales en el cinturón hortícola marplatense a fines de la década del noventa. *Estudios Socioterritoriales* 2007; 7:98-119.
- Giarracca N, Teubal M. Disputas por los territorios y recursos naturales: el modelo Extractivo. *Rev ALASRU Nueva Época* 2010; 5:113-130.
- Lacaze MV, Atucha AJ, Adlercreutz E. Valor agregado de los cultivos hortícolas tradicionales de General Pueyrredon, Argentina, en el período 1993-2010. *Rev Agroalimentaria* 2017; 23(44):133-151.
- Barsky A. *Gestionando la diversidad del territorio periurbano desde la complejidad de las instituciones estatales* [tesis]. España: Universidad Autónoma de Barcelona; 2013.
- Di Pace M. *Ecología de la Ciudad*. Buenos Aires: Prometeo; 2004.
- Benencia R, Quaranta G. Mercados de trabajo y economía de enclave. La escalera boliviana en la actualidad. *Rev Estudios Migratorios Latinoamericanos* 2006; 20(60):83-113.
- Sánchez C, Barberis NA. *Caracterización del territorio Centro de la provincia de Córdoba*. Córdoba: Ediciones INTA; 2013.
- Pizarro C, Trpin V. Trabajadores frutícolas y hortícolas en la Argentina. Una aproximación socioantropológica a las prácticas de reproducción y resistencia de las condiciones laborales. *Ruris* 2010; 4(2):199-228.
- Machado AL, Butinof M, Portilla AL, Eandi M, Sastre A, Blanco M. Los trabajadores hortícolas del cinturón verde de Córdoba: ¿Población oculta? *Rev Electrónica Psicol Política* 2014; 12:32.
- García M, Lemmi S. Política legislativa y trabajo en la horticultura del Área Metropolitana de Buenos Aires (Argentina). Orígenes y continuidades de la precarización laboral en la horticultura. Secuencia. *Rev Historia Cien Soc* 2011; 79:91-112.
- Arcury TA, Quandt SA, Russell GB. Pesticide Safety among Farmworkers: Perceived Risk and Perceived Control as Factors Reflecting Environmental Justice. *Rev Environ Health Perspect* 2002; (110):233-240.
- Gras C, Hernández V. Modelo productivo y actores sociales. *Rev Mex Sociol* 2008; 70(2):227-259.
- Colamarino I, Curcio N, Ocampo F, Torrand C. Producción Hortícola en Argentina. *Rev Alimentos Argentinos* 2006; 33:45-48.
- Lindón A. *La vida cotidiana y su espacio-temporalidad*. México: Anthropos Editorial; 2000.
- Butinof M, Fernández R, Lantieri MJ, Stimolo MI, Blanco M, Machado AL, Franchini G, Gieco M, Portilla M, Eandi M, Sastre A, Diaz MP. Pesticides and Agricultural Works Environments in Argentina. *Acta Toxicol* 2016; 24(1):58-67.
- Machado AL, Butinof M, Eandi M, Portilla A, Fernandez RA, Soria V, Franchini G. Vulnerabilidad y riesgo por plaguicidas en horticultura del cinturón verde en Córdoba, Argentina. *Rev Fac Nac Salud Pública* 2017; 35:1.

18. Mingo E. El trabajo de las mujeres en la agricultura y la agroindustria del Valle de Uco, provincia de Mendoza. Trabajo asalariado, trabajo doméstico y división sexual del Trabajo. *Rev Crítica Cien Sociales Jurídicas Nómadas* 2011; 29:1.
19. Otero J, Larrañaga G, Hang G. La organización del trabajo en la horticultura familiar de La Plata (Argentina). *Rev Facultad Agronomía* 2013; 112(2):79-90.
20. Breilh J. *Epidemiología Crítica. Ciencia emancipadora e interculturalidad*. Buenos Aires: Lugar Editorial; 2003.
21. Alavanja MC, Ross MK, Bonner MR. Increased cancer burden among pesticide applicators and others due to pesticide exposure. *Rev CA Cancer J Clin* 2013; 63(2):120-142.
22. Remor AP, Totti CC, Moreira DA, Dutra GP, DahlströmHeuser V, Boeira JM. Occupational exposure of farm workers to pesticides: Biochemical parameters and evaluation of genotoxicity. *Environment International* 2009; 35(2):273-278.
23. Breilh J. La determinación social de la salud como herramienta de ruptura hacia la nueva salud pública (salud colectiva) (Epidemiología crítica latinoamericana: raíces, desarrollos recientes y ruptura metodológica). En: *VIII Seminario Internacional de Salud Pública, Saberes en Epidemiología en el Siglo XXI*. Bogotá: Universidad Nacional de Colombia; 2013.
24. Castellanos PL. Los Modelos Explicativos Del Proceso Salud-Enfermedad: Los Determinantes Sociales. *Bol Epidemiológico OPS* 1990; 10:4.
25. Paim JS. *Desafíos para la salud colectiva en el siglo XXI*. Buenos Aires: Lugar Editorial; 2011.
26. Almeida Filho N. *Epidemiología sin números. Una introducción crítica a la ciencia epidemiológica*. Washington: OPS; 1992.
27. Guba EG. *The Paradigm Dialog*. Edit Newbury Park, California: Sage Publications; 1990.
28. Ulin PR, Robinson ET, Tolley EE. *Investigación aplicada en salud pública. Métodos cualitativos*. Washington: OPS; 2006.
29. Glaser BG, Strauss A. *The Discovery of Grounded Theory: Strategies for Strategies for Qualitative Research*. Estados Unidos: Aldine transaction; 1967.
30. Elorza AL. Territorios segregados: representaciones y prácticas en barrios de vivienda social. El caso del barrio "Ciudad de los Cuartetos - 29 de mayo" (Córdoba, Argentina). *Cultura Representaciones Soc* 2018; 12(24):311-337.
31. Corder EH, Mellick GD. Hemostatic, inflammatory, and oxidative markers in pesticide user farmers. *J Biomed Biotech* 2006; 21(2):138-145.
32. Corsini E, Liesivuori J, Vergieva T, Van Loveren H, Colosio C. Effects of pesticide exposure on the human immune system. *Hum Exp Toxicol* 2008; 27:671-680.
33. Lacasana M, Lopez-Flores I, Rodriguez-Barranco M, Aguilar-Garduno C, Blanco-Munoz J, Pérez-Méndez O, Gamboa R, Bassol S, Cebrian ME. Association between organophosphate pesticides exposure and thyroid hormones in floriculture workers. *Toxicol Appl Pharmacol* 2010; 243(1):19-26.
34. Perry MJ, Venners SA, Chen X, Liu X, Tang G, Xing H, Barr DB, Xu X. Organophosphorous pesticide exposures and sperm quality. *Reprod Toxicol* 2011; 31(1):75-79.
35. Neiman G. Los estudios sobre el trabajo agrario en la última década: una revisión para el caso argentino. *Mundo Agrario* 2010; 10(20):1-19.
36. Secretaria de Comercio Interior Corporación del Mercado Central de Buenos Aires. *La producción de hortalizas en Argentina* [Internet]. Disponible en: http://www.central-servicios.com.ar/cmcb/ziptecnica/la_produccion_de_hortalizas_en_argentina.pdf.
37. Giarracca N, Teubal M. Del desarrollo agroindustrial a la expansión del agronegocio: el caso argentino. En: Mancano Fernandez B, organizador. *Campesinato e agronegocio na América Latina: a questão agrária atual*. São Paulo: CLACSO-Expressão Popular; 2008.
38. Viglizzo EF, Frank FC. Erosión del suelo y contaminación del ambiente. En: Viglizzo EF, Jobbágy E, editores. *Expansión de la Frontera Agropecuaria en Argentina y su impacto Ecológico-Ambiental*. Buenos Aires: Ediciones INTA; 2010. p. 37-41.
39. Carballo GC. Soberanía alimentaria y producción de alimentos en Argentina. Situación actual y desafíos para la transición. En: Gorban M. *Seguridad y Soberanía Alimentaria*. Buenos Aires: AKADIA; 2014.
40. Soares WL, Porto MF. Pesticide use and economic impacts on health. *Rev Saúde Pública* 2012; 46(2):209-217.
41. Delgado IF, Paumgartten FJR. Intoxicações e uso de pesticidas por agricultores do Município de Paty do Alferes, Rio de Janeiro, Brasil. *Cad Saúde Pública* 2004; 20(1):180-186.
42. Porto MF, Soares WL. Modelo de desenvolvimento, agrotóxicos e saúde: um panorama da realidade agrícola brasileira e propostas para uma agenda de pesquisa inovadora. *Rev Bras Saúde Ocup* 2012; 37(125):17-31.
43. Machado A, Butinof M, Portillas M, Eandi M, Sastre A, Blanco M. Los trabajadores hortícolas del cinturón verde de Córdoba: ¿Población oculta? *Rev Electrónica Psicol Política* 2014; 12(32):1-15.
44. Rozas J, Sánchez-DelBarrio JC, Messeguer X, Rozas R. DnaSP, DNA polymorphism analyses by the coalescent and other methods. *Bioinformatics* 2003; 19(18):2496-2497.
45. Mitidieri MS, Corbino GS. *Manual de horticultura periurbana*. San Pedro: Ediciones INTA Argentina; 2012.
46. Badii M, Landeros J. Plaguicidas que afectan a la salud humana y la sustentabilidad. *Rev CULCyT* 2007; 4(19):21-34.
47. Foucault M. *Hermenéutica del sujeto*. La Plata: Altamira; 1996.
48. Carrasco AE, Sánchez NE, Tamagno LE. *Modelo agrícola e impacto socioambiental en la Argentina: monocultivo y agronegocios*. La Plata: AUGM; 2012.
49. Hardin G. The Tragedy of Commons. *Rev Science* 1968; 162:1243-1248.

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