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Boletín de Seguridad y Salud en el Trabajo del Sector Agrícola

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Laboratorio-Observatorio Andaluz de Condiciones de Trabajo en el Sector Agrícola (LASA)

https://www.juntadeandalucia.es/organismos/iaprl/areas/investigacion/lasa.html

FINALIDAD DE ESTE DOCUMENTO

Este boletín, realizado desde el Laboratorio-Observatorio Andaluz de Condiciones de Trabajo en el Sector Agrícola (LASA), engloba diferentes artículos científicos sobre Seguridad y Salud en el Trabajo (SST) en el sector de la agricultura. Recoge trabajos que han sido publicados en revistas del Journal Citation Reports en el tercer cuatrimestre del año 2025. Se expone el título y resumen en inglés de cada artículo junto con su información principal. Además, en todos se presenta un breve resumen en español de los aspectos más destacados. Este boletín pretende facilitar la revisión de los artículos publicados en este ámbito en el período de tiempo indicado y el acceso a las revistas correspondientes.

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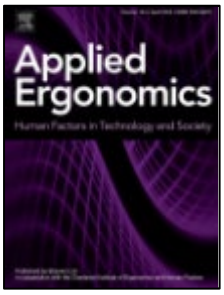

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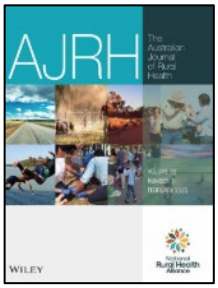
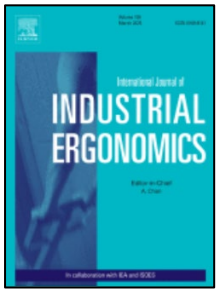


JOURNAL OF OCCUPATIONAL HEALTH

INTERNATIONAL JOURNAL OF INDUSTRIAL ERGONOMICS



JOURNAL OF AGROMEDICINE

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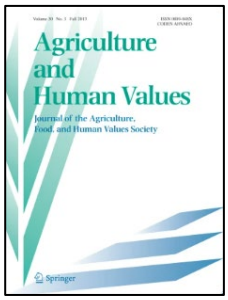

ERGONOMICS

JOURNAL OF AGRICULTURAL SAFETY AND HEALTH

ARTÍCULO 1: Modeling the Role of Weather Patterns and Grain Quality in On-Farm Engulfments and Entrapments

Despite the clear hazard of out-of-condition grain, limited research has explored the role of specific indicators of grain condition and their impact on the rate of grain entrapments and engulfments. This project focuses on corn because it is the primary crop involved with documented grain entrapments and engulfments. The primary aim of the project was to identify significant factors associated with the moisture of harvested corn and to analyze the relationship between these factors and the occurrence of engulfment and entrapments. First, it was found that both year and state were associated with corn moisture. Further, the relationship between corn moisture and weather variables in the U.S. Corn Belt was investigated. It was found that both maximum high temperature and relative humidity predict corn moisture. A secondary goal was to measure the relationship between selected weather factors, the moisture of commodity corn, and on-farm and commercial entrapment and engulfment incidents in the U.S. Corn Belt. Year, state, and maximum relative humidity were found to be important in predicting the occurrence of engulfments and entrapments. Future work should examine other quality factors using modeling, including test weight, total damage, foreign material, and more detailed weather data to consider several prediction alternatives.

Modelización del papel de los patrones meteorológicos y la calidad del grano en los enterramientos y atrapamientos en explotaciones agrícolas

Esta investigación analizó los factores asociados con la humedad del maíz cosechado y su relación con la incidencia de atrapamientos o enterramientos. Se identificaron el año y el estado como factores significativos. También se estudió la relación de las variables meteorológicas en el Cinturón del Maíz de Estados Unidos y la humedad del maíz, concluyendo que esta se relacionaba con la temperatura máxima diaria y la humedad relativa. Se concluyó que el año, el estado y la humedad relativa máxima eran factores relevantes para la predicción de atrapamientos y enterramientos.

AUTORES	Gretchen A. Mosher, Elzerie Derry, Mateus Pizarro, Yan Jiang, Cheryl Beseler
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PUBLICACIÓN	Journal of Agricultural Safety and Health, 2025, Volumen 31, Número 4, pp. 299-310
TEMÁTICA	Accidentes y Enfermedades Laborales

ARTÍCULO 2: SaferAg – Engineering Safety in Emerging Agricultural Machinery: Risk Assessment, Data Needs, and Standards

The introduction of highly automated and autonomous agricultural machinery has led to concerns about the availability of appropriate historical data for engineering design risk assessment to ensure protection from injury and other unexpected events. During the transition period from traditional farm tractors and machines to those more highly automated, industry-based, consensus standards remain a vital tool in the design process. This paper examines the role of risk assessment methods and consensus-based standards in improving safety for these technologies. It includes cited literature presented in the form of a primer or overview at the request of participants at the 2022 SaferAg workshop. It reviews key risk assessment concepts, common methodologies, and the specific data needs and limitations that arise when historical incident records are unavailable. The paper also outlines how standards are developed, their connection to regulation, and recent updates to ISO 18497 relevant to autonomous agricultural equipment. Key challenges include lag times in standard development, uneven access to standards, and gaps in awareness among both designers and policymakers engaged in new regulatory efforts. Addressing these challenges will require coordinated efforts in data collection, standard refinement, and stakeholder education to ensure safe and effective deployment of emerging agricultural machine forms.

SaferAg – Ingeniería de la seguridad en la maquinaria agrícola emergente: evaluación de riesgos, necesidades de datos y normas

Este artículo analiza los métodos de evaluación de riesgos y normativas destinadas a la seguridad de maquinaria agrícola automatizada y autónoma. Se revisan conceptos de evaluación de riesgos, metodologías, necesidades y limitaciones de datos que aparecen cuando no se dispone de registros de incidentes. También se exponen aspectos fundamentales sobre las normativas y sus actualizaciones. Como limitaciones se mencionan el retraso en el desarrollo de normas, el acceso desigual a las mismas y la falta de conocimiento entre diseñadores y reguladores. Se concluye que para una mejora en la seguridad de estas nuevas tecnologías es necesario coordinar esfuerzos en la recolección de datos, actualización de estándares y formación de los actores involucrados.

AUTORES	John M. Shutske, Salah F. Issa, Farzaneh Khorsandi, Michael L. Pate, Serap Gorucu, Jean Walsh, Aaron M. Yoder, Guy R. Aby, Sihan Li
DOI	https://doi.org/10.13031/jash.16516
PUBLICACIÓN	Journal of Agricultural Safety and Health, 2025, Volumen 31, Número 4, pp. 311-324
TEMÁTICA	Vehículos y Maquinaria Agrícola

ARTÍCULO 3: Designing a Farm Emergency Plan Utilizing Artificial Intelligence

The ability of three artificial intelligence systems (ChatGPT, Microsoft Copilot, and Google Gemini) to generate functional Farm Emergency Plans (FEP) for a typical Midwestern row crop grain farm was evaluated. Four prompts, each of increasing levels of specificity, were used with the three AI systems, yielding twelve distinct FEPs. A rubric was developed to evaluate each of the twelve AI products against the findings of a review of relevant current literature including academic, government, not-for-profit, and insurance sources to identify essential and consistent components of a FEP.

Both ChatGPT and Microsoft Copilot were found to provide valuable starting points for developing FEPs when detailed prompts were provided, while Google Gemini results were less useful. However, none of the systems were capable of independently generating FEPs at the time of this study. Plans that were deemed as unreliable or incomplete enough for application were primarily due to the diverse nature of agricultural operations, limited resources on agricultural emergency preparedness, and the lack of maturity of current AI systems. Findings showed the essential need of using AI systems in collaboration with human guidance and input from other evidence-based sources to create effective FEPs. Similar results were confirmed in which the AI systems were prompted for emergency responses to three specific farm-related emergencies as part of the FEP: (1) flowing grain entrapment, (2) hazardous agricultural chemical spills, and (3) anhydrous ammonia exposure. The need for additional input was found to be essential. Outcomes were limited in scope to the particular type of farm selected for testing and the ability of the AI systems when they were queried on 30 September 2024; 12 February 2025; and 7 March 2025. Since AI systems rapidly continue to mature as they are "exercised," further inquiries will, therefore, yield different outcomes, because AI has become more sophisticated and developed every day. It should also be noted that for "best practices," the inquirer should provide AI with any resources that they have found and provide multiple inquiries to gain the best and most accurate results. This study demonstrated the potential that AI offers to agricultural producers, specifically in emergency preparedness and response, while emphasizing prompt development and user competency to verify AI outputs.

Diseño de un plan de emergencia agrícola utilizando inteligencia artificial

Se investigó la eficiencia de tres herramientas de inteligencia artificial (IA), en concreto ChatGPT, Microsoft Copilot y Google Gemini, para la realización de planes de emergencia agrícola en granjas de cultivo de grano en Medio Oeste (Estados Unidos). Se emplearon cuatro prompts para las tres herramientas de IA, creando por tanto un total de doce. Se realizó una rúbrica para evaluar cada uno de ellos. Los resultados mostraron que ChatGPT y Microsoft Copilot proporcionaron buenos puntos de partida para la creación de estos planes, siendo menos útiles los de Google Gemini. Por el contrario, ninguna de los tres sistemas realizó un plan de emergencia agrícola completo y fiable, debido principalmente al gran número de tareas agrícolas, recursos limitados sobre emergencias y falta de desarrollo de la IA. Se concluyó la necesidad de emplear estas herramientas junto con expertos humanos y otras fuentes. Puesto que la IA está en continuo desarrollo y actualización, futuras investigaciones podrían obtener otros resultados.

AUTORES	Noah J. Berning, Shawn G. Ehlers, William E. Field
DOI	https://doi.org/10.13031/jash.16412
PUBLICACIÓN	Journal of Agricultural Safety and Health, 2025, Volumen 31, Número 4, pp. 325-348
TEMÁTICA	Inteligencia Artificial

ARTÍCULO 4: Utility and Safety of Compressed Air in Preventing Grain Entrapment

Grain entrapment, a severe and often fatal agricultural hazard, continues to pose a significant challenge in grain storage and handling. These incidents are often due to out-of-condition grain blocking outlets, leading to workers frequently entering the grain bin to dislodge grain. This study evaluates the utility of compressed air as a preventive measure to break up grain clumps located at bin outlets by conducting pilot and full-scale experiments using an air compressor. This study also evaluated potential hazards due to the use of air compressors. Three nozzle types were tested: open ½ inch, Crimped ½ inch, and the AirSpade. The findings indicated that the open ½ inch nozzle was the most efficient, with an average clearing time of 15 minutes per run, outperforming the crimped and AirSpade nozzles. Noise levels during operation ranged up to 105 dBA, with dust and fungal spore concentrations exceeding safety limits inside the grain bins and returning to acceptable levels shortly after operation. Full-scale testing indicates that compressed air can be useful in unclogging bins. The study underscores the potential of compressed air to enhance grain handling safety, offering practical safety recommendations and suggesting the need for further research to optimize and standardize its use in preventing grain entrapment.

Utilidad y seguridad del aire comprimido en la prevención de atrapamientos en grano

El riesgo de atrapamiento es frecuente en el almacenamiento y manipulación de granos. Este ocurre porque el grano en mal estado bloquea las salidas de los silos, por lo que los trabajadores acceden a su interior para solucionarlo. Este documento investiga el uso del aire comprimido como medida preventiva para desbloquear dichas salidas. Para ello, se hicieron experimentos piloto y se analizaron los posibles riesgos derivados del uso de compresores. Se emplearon tres boquillas diferentes: boquilla abierta de ½ pulgada, crimpeada de ½ pulgada y AirSpade. Los resultados mostraron que la primera fue la más eficiente, con un tiempo medio de limpieza de 15 minutos. Durante su uso, los niveles de ruido máximos fueron de 105 dBA y las concentraciones de polvo excedieron límites de seguridad en los silos, regresando a valores aceptables después de la operación. Se concluyó que esta técnica puede ser útil en los silos para mejorar la seguridad, aunque se requiere más investigación.

AUTORES	Daniel Gaither, Mian Muhammad Sajid Raza, Mei Tessum, Andy Miller, Salah F. Issa
DOI	https://doi.org/10.13031/jash.16210
PUBLICACIÓN	Journal of Agricultural Safety and Health, 2025, Volumen 31, Número 3, pp. 269-282
TEMÁTICA	Accidentes y Enfermedades Laborales

OCCUPATIONAL & ENVIRONMENTAL MEDICINE

ARTÍCULO 5: Atrazine use and markers of kidney function and nephrotoxicity among male farmers in the Biomarkers of Exposure and Effect in Agriculture Study

Objective: Atrazine, an herbicide widely used in US agriculture, has been associated with kidney cancer and non-malignant kidney disease. However, the potential mechanisms underlying these associations remain unclear. We evaluated atrazine use and biomarkers of kidney function and nephrotoxicity among male farmers in the Biomarkers of Exposure and Effect in Agriculture Study.

Methods: Our investigation included three groups of farmers defined based on atrazine use: (1) both recent (last 3 months) and past use (continuous users; n=83); (2) high lifetime use (≥178.5 lifetime days) but no recent use (former high users; n=88) and (3) never/low lifetime use (<50 lifetime days) and no recent use (never/low users; n=75). Biomarkers were measured in serum (creatinine, cystatin C, urea nitrogen, uric acid) and urine (kidney injury molecule-1 (KIM-1), albumin, creatinine). The 2021 CKD-EPI creatinine-cystatin C equation was used to calculate estimated glomerular filtration rate (eGFRcr-cys). We estimated the percentage difference (95% CI) in each marker across groups using multivariable linear regression.

Results: Compared with farmers with never/low atrazine use, continuous users had statistically significantly lower eGFRcr-cys (–9.4%; 95% CI –16.1% to –2.2%) and higher serum creatinine (9.4%; 95% CI: 1.6% to 17.9%) and cystatin C (10.8%; 95% CI 2.0% to 20.4%); no associations with these markers were observed for the former high users. We also observed higher uric acid for both former high and continuous users and lower urea nitrogen for former high users, although these associations were not statistically significant. Urine albumin-creatinine ratio and KIM-1 levels did not differ across groups.

Conclusions: Our findings add to the evidence that continued atrazine use is associated with diminished kidney function.

Uso de atrazina y marcadores de función renal y nefrotoxicidad en agricultores varones del estudio *Biomarkers of Exposure and Effect in Agriculture*

La atrazina es un tratamiento fitosanitario empleado en el sector agrícola que se asocia con riesgo de padecer cáncer y otras enfermedades renales. Se analizó el uso de este producto y su relación con los biomarcadores de función renal y nefrotoxicidad de agricultores hombres del estudio *Biomarkers of Exposure and Effect in Agriculture*. Los participantes se dividieron en tres grupos según el uso reciente de este tratamiento y acumulado a lo largo de la vida. Los biomarcadores se midieron en suero y orina, y se calculó la tasa de filtración glomerular estimada. Algunos resultados mostraron que los agricultores que utilizaban este producto de forma continua presentaron una tasa de filtración glomerular menor, así como concentraciones más elevadas de creatinina y cistatina, que aquellos que hacían uso bajo o nulo. Se concluyó que la utilización continuada de atrazina se asocia con una disminución de la función renal.

AUTORES	Gabriella Andreotti, Joseph J Shearer, Dale P Sandler, Anna M Lukkari, Richard V Remigio, Christine G Parks, Vicky C Chang, Venkata Sabbisetti, Laura E Beane Freeman, Amy B Karger, Jonathan N Hofmann
DOI	https://doi.org/10.1136/oemed-2025-110386
PUBLICACIÓN	Occupational & Environmental Medicine, 2025, Volumen 82, pp. 469-475
TEMÁTICA	Tratamientos Fitosanitarios

ARTÍCULO 6: Cause-specific mortality among banana plantation workers in the French West Indies

Objective: To describe cause-specific mortality patterns of banana plantation workers in the French West Indies.
Methods: The study included 11221 farmers and farm workers who had work in banana cultivation in the French West Indies (Guadeloupe or Martinique) between 1973 and 1993, followed up from January 1981 to December 2017. We calculated standardised mortality ratios (SMRs), causal mortality ratios (CMRs) and relative standardised mortality ratios (rSMRs) using regional reference rates.
Results: SMR analyses showed mortality deficits in the overall mortality and for almost all causes of deaths. In contrast, analyses using CMRs revealed a significant excess in the overall mortality. The CMRs were significantly elevated for all cancers combined and for stomach cancer, colorectal cancer, prostate cancer and haematopoietic malignancies, as well as for several non-cancer causes of death, including diabetes mellitus, Parkinson's disease, Alzheimer's disease, non-ischaemic heart diseases, pneumonia and diseases of the skin and subcutaneous tissue. rSMRs were in general consistent with CMRs with regards to the direction of the association, although rSMRs were lower and in some instances not statistically significant.
Conclusion: The CMR approach showed an elevated mortality for several causes of death, for which work in banana farming and/or exposure to pesticides are plausible explanations.

Mortalidad por causas específicas entre trabajadores de plantaciones bananeras en las Antillas Francesas

El objetivo de este estudio fue describir la mortalidad por causas concretas de trabajadores de plantaciones bananeras en las Antillas Francesas. El estudio englobó a 11221 agricultores de cultivo de banana, con seguimiento desde 1981 hasta 2017. Se calcularon razones de mortalidad estandarizadas (RME), razones de mortalidad causal (RCM) y razones de mortalidad estandarizadas relativas (rRME). Los resultados con RME presentaron déficits de mortalidad, tanto global como para casi todas las causas de muerte. Las RMC fueron altas para cánceres y para otras causas de muerte. Las rRME mostraron valores más bajos, y en algunos casos, no tuvieron significación estadística. Se concluyó que el análisis con RMC mostró una alta mortalidad para distintas causas, posiblemente asociadas al trabajo en cultivo de bananas o a la exposición a tratamientos fitosanitarios.

AUTORES	Danièle Luce, Juliette Gambaretti, Léah Michineau, Luc Multigner, Christine Barul
DOI	https://doi.org/10.1136/oemed-2025-110304
PUBLICACIÓN	Occupational & Environmental Medicine, 2025, Volumen 82, pp. 512-518
TEMÁTICA	Accidentes y Enfermedades Laborales

APPLIED ERGONOMICS

ARTÍCULO 7: Effects of different sorting table heights on low back and shoulders biomechanical loads during dungeness crab sorting

West Coast Dungeness crab fishers suffer a high prevalence of musculoskeletal injuries, especially low back pain. Substantial trunk flexion and associated low back loads during crab sorting tasks have been attributed to awkward sorting table heights. This study examined how varying table heights affect biomechanical loads on the low back and shoulders. Twenty-five participants performed crab sorting tasks at three table heights while trunk and shoulder joint angles, moments, muscle activity, perceived exertion, and discomfort were measured. Increasing table height reduced trunk flexion and lumbosacral (L5/S1) joint moments but increased shoulder flexion moments and upper trapezius muscle activity. Table height did not affect perceived exertion or discomfort. These findings indicate that increasing sorting table height can reduce biomechanical load on the low back but results in increased shoulder strain. This trade-off underscores the importance of adopting ergonomic designs balancing low back and shoulder biomechanics to determine appropriate sorting table height.

Efectos de diferentes alturas de la mesa de clasificación sobre las cargas biomecánicas en la zona lumbar y los hombros durante la clasificación del cangrejo Dungeness

Los pescadores de cangrejo Dungeness en la Costa Oeste sufren trastornos musculoesqueléticos, principalmente en la zona lumbar. Estos se relacionan con la carga en dicha zona y con una elevada flexión del tronco durante tareas de clasificación de cangrejos con mesas de altura no ergonómica. Esta investigación analizó cómo diferentes alturas de mesa afectaban a las cargas biomecánicas de los hombros y parte lumbar. Participaron 25 trabajadores realizando esta tarea con tres alturas de mesa y se tomaron medidas de los ángulos de articulaciones del tronco y hombros, momentos articulares, actividad muscular, percepción del esfuerzo y malestar. Un aumento de la altura de la mesa reducía la flexión del tronco del trabajador y los momentos articulares lumbosacros; sin embargo, aumentaba los momentos de flexión de hombros y la actividad del músculo trapecio superior. El malestar y la percepción del esfuerzo no se vieron afectados. Se concluyó que una altura mayor de la mesa de clasificación disminuiría la carga lumbar, pero supondría una tensión mayor en los hombros.

AUTORES	Mina Salehi, Seobin Choi, Kiana Kia, Allen Chan, Laurel Kincl, Jeong Ho Kim
DOI	https://doi.org/10.1016/j.apergo.2025.104537
PUBLICACIÓN	Applied Ergonomics, 2025, Volumen 128, 104537
TEMÁTICA	Riesgo Físico

AGRICULTURE AND HUMAN VALUES

ARTÍCULO 8: "If I feel like I am in danger, I leave": pesticide exposure, agentic strategies, and gender among Latine farmworkers in Idaho

Pesticide exposure is a common occupational hazard for Latine farmworkers laboring in the United States, causing harm to farmworkers' wellbeing and the wellbeing of their families and communities. While existing scholarly literature documents various issues related to occupational pesticide exposure for farmworkers, limited research has centered on farmworkers' voices to understand their views on pesticides, including the degree to which they express or experience a sense of agency in managing pesticide exposure. This paper outlines key findings from mixed methods research conducted throughout 2022 focused on pesticide beliefs and exposure among Latine farmworkers in Southwestern Idaho. Drawing from survey and interview data, we focus on findings related to the following questions: Do farmworkers believe they have agency in protecting themselves from pesticides? What strategies do farmworkers use to protect themselves from pesticides in their agricultural work? What factors limit or facilitate farmworkers engaging in agentic acts as they work to protect themselves from pesticides? We further consider these questions through a lens of gender, utilizing concepts of carework, hegemonic masculinity, and familism to frame how gender and intersectional factors may shape the degree to which and the ways in which agency is expressed and enacted by farmworkers in their agricultural labor.

"Si siento que estoy en peligro, me voy": exposición a tratamientos fitosanitarios, estrategias de agencia y género entre trabajadores agrícolas latinos en Idaho

La exposición a tratamientos fitosanitarios constituye un riesgo laboral frecuente en trabajadores del sector de la agricultura en Estados Unidos. Este artículo estudia la percepción, gestión y estrategias de protección para esta exposición de los agricultores latinos del suroeste de Idaho. Se emplearon métodos mixtos basados en encuestas y entrevistas, donde se tuvo en cuenta la perspectiva de género.

AUTORES	Rebecca L. Som Castellano, Lisa Meierotto, Carly Hyland, Cynthia Curl
DOI	https://doi.org/10.1007/s10460-025-10748-7
PUBLICACIÓN	Agriculture and Human Values, 2025, Volumen 42, pp. 2015-2031
TEMÁTICA	Tratamientos Fitosanitarios

ARTÍCULO 9: LGBTQ+ farmers' supportive relationships and mental health outcomes
Social support is a crucial protective factor for mental health, including for farmers. Farmers' social support has been associated with greater psychological well-being and reduced distress. However, little research has focused on lesbian, gay, bisexual, transgender, and/or queer (LGBTQ+) farmers and few studies have examined the role of social support for LGBTQ+ farmer mental health. The current study presents findings from analysis of survey data (N=148) and semi-structured interview data (N=17) to better understand United States (U.S.) LGBTQ+ farmers' mental health experiences and the role of social support. Greater LGBTQ+ companionship was associated with less farm-specific stress, less LGBTQ+ victimization, fewer anxiety and depressive symptoms, and decreased suicide risk. Greater connection to LGBTQ+ friends and community were each associated with fewer poor mental health outcomes. Findings elucidate how LGBTQ+ farmers' experiences of farm-related stress and LGBTQ+ victimization negatively impact mental health, while LGBTQ+ companionship is a form of social support that positively influences mental health. Researchers, practitioners, and policymakers in agriculture should question family and relationship-related assumptions and work to be inclusive of diverse family structures and relationships to ensure their work is supportive of LGBTQ+ farmers.

Relaciones de apoyo y resultados en la salud mental de agricultores LGBTQ+	
El apoyo social en trabajadores del sector agrícola se asocia con un aumento del bienestar psicológico. Este estudio analiza la salud mental y el apoyo social en agricultores LGBTQ+ (lesbianas, gais, bisexuales, transgénero y/o queer) en Estados Unidos. Se realizaron 148 encuestas y 17 entrevistas semiestructuradas. Los resultados mostraron que una mayor compañía y conexión con la comunidad LGBTQ+ se relacionaba con menor estrés, ansiedad y depresión en el ámbito laboral, fomentando una mejor salud mental.	
AUTORES	Asa Billington, Anisa Codamon, Courtney Cuthbertson, Dane Rivas-Koehl, Matthew Rivas-Koehl
DOI	https://doi.org/10.1007/s10460-025-10770-9
PUBLICACIÓN	Agriculture and Human Values, 2025, Volumen 42, pp. 2711-2725
TEMÁTICA	Riesgo Salud Mental

ARTÍCULO 10: Understanding the phases and tensions of regenerative agriculture for better health outcomes for farmers

Australian farmers face an array of challenges impacting mental health, such as extreme climatic events, market uncertainties, technological dependence, regulatory demands, and social isolation. Regenerative agriculture (RA) has been suggested as a way for farmers to improve wellbeing by integrating natural systems, continuous evaluation, and adaptation—while benefitting from the socio-cultural aspects of farmer relations—for sustainable food production. This rapid review of the literature aims to synthesise evidence on the relationship between RA practices and farmer mental health and wellbeing. The review encompassed 9 databases (n = 13795 articles) and 3 sources of grey literature (n = 209 studies). The final 44 items included in the review demonstrated that regenerative agricultural practices have gained recognition for environmental benefits and that the impact on farmers' mental health has started to be explored. Findings show underlying tensions in the transition process from conventional farming practices to RA—including notable phases of triggering, accepting alternatives, adopting, and adapting. Although evidence is still scarce and limited in its scope, tailored mental health intervention and prevention strategies need to consider farmers' vulnerability during these RA transition phases. Importantly, farmers need different supports at different phases of the system.

Comprendiendo las fases y tensiones de la agricultura regenerativa para mejorar los resultados de salud de los agricultores

Se realizó una revisión bibliográfica para analizar la relación entre la agricultura regenerativa y la salud mental de los agricultores. Se emplearon nueve bases de datos (13795 artículos) y tres fuentes de literatura gris (209 estudios). Se incluyeron 44 ítems en la revisión, que indicaron que este tipo de agricultura está tomando importancia por sus beneficios ambientales y que la influencia sobre la salud mental de estos trabajadores ha empezado a investigarse. La transición de la agricultura tradicional a la regenerativa requiere adaptación, aceptación de alternativas y otras fases que pueden generar vulnerabilidad en los agricultores. Por tanto, deben desarrollarse estrategias de salud mental para cada etapa durante esta transición.

AUTORES	Amity Latham, Iván Matovich, Brittany Doolan, Susan-Lee Anderson, Durre Shahwar, Chrissy Freestone, Deirdrie Gregory, Jacqueline Cotton, Alison Kennedy
DOI	https://doi.org/10.1007/s10460-025-10771-8
PUBLICACIÓN	Agriculture and Human Values, 2025, Volumen 42, pp. 3113-3128
TEMÁTICA	Riesgo Salud Mental

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ARTÍCULO 11: Farm Injury Deaths and Workers' Compensation Claims in Australia and Their Economic Costs

Objective: To describe the pattern and estimated direct economic burdens associated with unintentional deaths and injuries on Australian farms over the past 11years (2013–2023).
Design: Descriptive retrospective epidemiological study of National Coronial Information System (NCIS) data for persons fatally injured on a farm and workers' compensation injuries data from the National Data Set.
Setting: Australia.
Participants: All agricultural cases involving fatal injury events and those being injured accessing workers compensation.
Main Outcome Measures: Nature of fatal and injury events, with estimates on the economic costs associated with deaths and workers' compensation injury claims costs.
Results: There were 748 farm fatalities, with 544 (73%) being work-related. From these, 513 (94%) of the cases occurred in males, with almost half (48%) in farmers aged 60years or older. The leading agents for fatalities were tractors (n=118), quad-bikes (n=117) and farm utilities (n=52). Costs for all fatalities (work and non-work), approached $1.8 billion in the 2013-2023 period (~$164 million per year). Work-related fatalities accounted for $1.24 billion of this total, with an annual cost of approximately $112 million. There were around 5000 workers' compensation injury claims processed per year during 2013–2021, costing over $1.5 billion (~$190 million per year).
Conclusion: The costs for all on-farm injury deaths and workers' compensation injury claims conjointly during the period of 2013–2023, includes a conservative annual estimate of $355 million per year. Of this sum, approximately $300 million involved work-related incidents. Although there is a modest progression in reducing farm deaths and injuries, targeted and evidence-based approaches are required to stimulate improvements in these preventable incidents.

Muertes por accidentes agrícolas y reclamaciones de compensación laboral en Australia y sus costos económicos

Se analizó el patrón y el coste económico de muertes y lesiones laborales en la agricultura australiana entre 2013 y 2023. Los datos de mortalidad se obtuvieron del *"National Coronial Information System"* y los de lesiones cubiertas por compensación laboral del *"National Data Set"*. Los resultados mostraron un total de 544 muertes relacionadas con el trabajo, de las que el 94% correspondió a hombres y el 48% a trabajadores de 60 años o más. Las causas principales se relacionaron con el uso de vehículos agrícolas de distinto tipo. Los costes supusieron 1,24 mil millones de dólares, con un coste anual de 112 millones. Por otra parte, se gestionaron alrededor de 5000 reclamaciones de compensación laboral por lesiones cada año, con un coste mayor de 190 millones de dólares anuales. Se concluyó la importancia de promover medidas para la prevención de estos sucesos.

AUTORES	Carlos Mesa-Castrillon, Kerri-Lynn Peachey, Tony Lower
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TEMÁTICA	Accidentes y Enfermedades Laborales

ERGONOMICS

ARTÍCULO 12: Design and regulation as a chain of determinants in the emergence of pesticide exposure situations during the use of sprayers

Our study was carried out in winegrowing in France and relates to the prevention of pesticide exposure situations. During treatments, the sprayer is a technical determinant directly responsible for these situations because of its design. The objective of our study is to gain a better understanding of pesticide exposure situations during the use of sprayers, by identifying the design of these machinery and the regulations that apply to it as a chain of determinants. Focusing on activity-centred ergonomics, this qualitative study formulates ergonomic (video recorded observations and interviews) and legal (content regulation) analyses at each level of this chain (treatments activities, sprayer design activities, regulation, and regulation development activities). The results highlight the role of design and regulation in the emergence of pesticide exposure situations, due to a little consideration of the real work of winegrowers. This means that design and regulation are relevant change levers for sustainable preventive action.

El diseño y la regulación como factores determinantes en la exposición a tratamientos fitosanitarios durante el uso de pulverizadores

Se analizó la exposición a tratamientos fitosanitarios durante el uso de pulverizadores en viñedos de Francia, considerando el diseño de dichas máquinas y las regulaciones aplicadas como factores influyentes. Se realizaron evaluaciones ergonómicas, mediante grabación en vídeo y entrevistas, y análisis de normativa en las tareas de tratamiento, diseño de pulverizadores, regulación y desarrollo de regulación. Se concluyó que tanto el diseño como la regulación, que no suelen considerarse en el trabajo de los viticultores, son opciones para realizar cambios orientados a la prevención de la exposición a pesticidas.

AUTORES	Marion Albert, Louis Galey, Nathalie Judon, Alexandre Charbonneau, Alain Garrigou
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TEMÁTICA	Tratamientos Fitosanitarios

INTERNATIONAL JOURNAL OF INDUSTRIAL ERGONOMICS

ARTÍCULO 13: Shoulder pain influences kinematics during farm work tasks: An in-field study

Background: Work-related musculoskeletal disorders (MSDs) are prevalent among agricultural producers. Upper limb MSDs, especially in the shoulder and neck, are common, yet research on their development and prevention is limited. This study aims to investigate the influence of shoulder pain, age, and sex on shoulder kinematics during farm work tasks.

Methods: Farmers in Saskatchewan were recruited and divided into groups with and without shoulder pain. Participants performed four tasks (Overhead Drill, Climb Seeder, Seed Bag Lift, Shovel) while wearing inertial measurement units (IMUs) to track humeral and scapular movements. Data were analyzed using linear regression and Kruskal-Wallis tests ($p < .05$) to assess the effects of pain, age, and sex on shoulder kinematics.

Results: Forty-two participants (23 without pain, 19 with pain) completed the study. Pain significantly influenced shoulder kinematics during the Overhead Drill, Seed Bag Lift, and Shovel tasks. During the Overhead Drill, the pain group exhibited higher scapular upward rotation ($p = .04$, +5.1°) and females showed lower maximal humeral elevation ($p = .049$, −11.7°). In the Seed Bag Lift, the pain group had lower scapular upward rotation ($p = .012$, −18.7°) and higher humeral internal rotation ($p = .04$, +12.0°). Humeral elevation was also lower in the pain group during the Shovel task ($p = .019$, −12.7°).

Conclusions: Shoulder pain affects shoulder kinematics in farm work tasks, with variations depending on the task. Pain-related compensations can be both protective and harmful. These findings highlight the potential risk for shoulder injury in many aspects of farm work.

El dolor de hombro influye en la cinemática durante tareas agrícolas: un estudio de campo

Los trastornos musculoesqueléticos de origen laboral son comunes en los trabajadores de la agricultura. Esta investigación analizó la influencia del dolor de hombro, el sexo y la edad en la cinemática del hombro durante la realización de las labores. Participaron 42 trabajadores de Saskatchewan, divididos en dos grupos: con dolor de hombro (19) y sin dolor (23). Se evaluaron cuatro tareas concretas (taladro por encima de la cabeza, subida a sembradora, levantamiento de bolsa de semillas y utilización de pala). Los movimientos del húmero y escápula se registraron mediante sensores y los datos se analizaron con regresión lineal y pruebas Kruskal-Wallis. Los resultados mostraron que el dolor influía en la cinemática del hombro en tres tareas. En la que se empleaba taladro, el grupo de participantes con dolor presentó mayor rotación de la escápula y las mujeres menor elevación del húmero. En el levantamiento, menor rotación de la escápula y mayor rotación del húmero. En la labor con pala, menor elevación del húmero. Se concluyó la necesidad de medidas preventivas para disminuir el riesgo de lesiones en hombros.

AUTORES	Angelica E. Lang, Denise Balogh, Opeyemi Vincent Akinluyi, Niels Koehncke
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TEMÁTICA	Riesgo Físico

ARTÍCULO 14: Heat stress and heat-related illnesses among male and female refugee agricultural workers in Lebanon

Heat stress among agricultural workers has intensified as a result of climate change, with women disproportionately affected due to physiological, social, and occupational factors. This study investigates heat-related illnesses (HRI), defined by the presence of heat-related symptoms, among male and female Syrian agricultural workers in greenhouse farms of Lebanon's farming communities.

A cross-sectional analysis was carried out among 90 agricultural workers (43 male pesticide sprayers and 47 female harvesters) in 32 farms. Data were collected in summer 2024 (August–September) from Syrian workers aged between 18 and 55 years old. Heat stress was assessed using environmental measures (Wet Bulb Globe Temperature [WBGT]) and physiological indicators included heart rate and estimated core body temperature; this was complemented by field observations during the observed work period. HRI and other occupational factors were assessed using structured questionnaires. Sociodemographic, occupational, and environmental factors were compared between male and female workers. Multivariable logistic regression was used to identify HRI risk factors.

Female workers were significantly more likely to report HRI compared to males (65.9 % vs 37.2 %, p = 0.006). We attribute this difference to biological and occupational factors, particularly in the local context. Higher odds of HRI were also observed with younger age, longer work hours, more strenuous workloads, extended restroom travel times, wearing multiple layers, and working in environments where WBGT inside greenhouses exceeded 26.6 °C. This study underscores the role of task allocation within agricultural work in predicting the risk of HRI. It particularly emphasizes the health implications of gendered labor segregation in agriculture.

Estrés térmico y enfermedades relacionadas con el calor entre trabajadores agrícolas refugiados masculinos y femeninos en Líbano

Se estudiaron las enfermedades asociadas con el calor en trabajadores sirios de invernaderos en el Líbano. Participaron 90 agricultores de 32 fincas (43 hombres aplicadores de tratamientos fitosanitarios y 47 mujeres dedicadas a la cosecha), de entre 18 y 55 años. La recogida de datos se llevó a cabo entre agosto y septiembre de 2024. Se utilizaron medidas ambientales (temperatura de globo y bulbo húmedo) e indicadores fisiológicos (frecuencia cardíaca y temperatura central estimada), además de observación en campo y utilización de cuestionarios estructurados. Se utilizó regresión logística multivariable para analizar los factores de riesgo. Los resultados mostraron que las mujeres tenían mayor probabilidad de reportar enfermedades relacionadas con el calor que los hombres, debido a factores biológicos y laborales. También tenían mayor riesgo los trabajadores más jóvenes, con jornadas más extensas, mayor carga de trabajo, utilización de varias capas de ropa y trabajo en lugares con elevadas temperaturas.

AUTORES	Rima R. Habib, Lina M. Fakih, Ghida Al Nakib, Lea Saad, Fida Awada, Mira F. Kanaan, Zeinab Awad, John C. Flunker, June T. Spector, Iman Nuwayhid
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TEMÁTICA	Temperatura

ARTÍCULO 15: Association of self-perceived work ability with worksite temperature as modified by relative humidity and air velocity: a cross-sectional study of poultry workers in Thailand

The combined association of self-perceived work ability with ambient temperature, relative humidity, and air velocity in the poultry industry has not been described. We asked 286 poultry workers in Thailand regarding their perceived work ability and regressed the data on worksite temperature, relative humidity, air velocity, interactions, workers' characteristics, and work-related factors. The mean age of the workers was 32.7 years (range, 18–57 years), and 166 (58 %) were men. The average worksite temperature, relative humidity, and air velocity were 3.7 °C (range, −21.6–23.0 °C), 46.6 % (range, 27.0–72.0), and 0.44 m/s (range, 0.01–3.00 m/s), respectively. The mean work ability score was 8.29 (range, 4–10), and 68 participants (23.8 %) reported poor work ability (≤7). At cold and humid sites (temperature <2.0 °C; relative humidity >50 %), the prevalence of poor work ability increased with falling temperature (23.0 °C to −21.6 °C), by up to 94.2 % percentage points at the highest air velocity and highest relative humidity. At warmer and drier sites (temperature ≥2.0 °C; relative humidity <35 %), the prevalence of poor work ability increased from cold to warm sites (−21.6 °C–23.0 °C), by up to 70.5 % percentage points at sites with the lowest relative humidity and lowest air velocity. Workers at cold and humid sites (19.6 %) and those at warm and dry sites (17.8 %) suffer from poor work ability and need preventive actions. These groups require advice to minimise work hazards for various combinations of temperature, humidity, and air velocity.

Asociación entre la capacidad laboral autopercibida y la temperatura en el lugar de trabajo, modificada por la humedad relativa y la velocidad del aire: un estudio transversal en trabajadores avícolas en Tailandia

Se analizó la relación entre la capacidad laboral autopercibida, la temperatura ambiente, la humedad relativa y la velocidad del aire en la industria avícola. Se realizó una encuesta a 286 trabajadores de este sector en Tailandia sobre su capacidad laboral. Además, se obtuvo la temperatura, humedad relativa y velocidad del aire, junto con las características de los trabajadores y otros factores laborales. Los valores medios obtenidos para cada parámetro analizado fueron: temperatura 3,7 °C, humedad relativa 46,6 %, velocidad del aire 0,44 m/s y capacidad laboral con puntuación de 8,29 (rango 4-10). El 23,8% de los participantes indicaban capacidad laboral baja. La principal conclusión fue que los trabajadores en entornos fríos y húmedos (19,6%) y en cálidos y secos (17,8%) presentan capacidad laboral reducida, lo que requiere medidas preventivas.

AUTORES	Wisanti Laohaudomchok, Wantanee Phanprasit, Pajaree Konthonbut, Vorakamol Boonyayothin, Sirkka Rissanen, Kirsi Jussila, Tiina M. Ikäheimo, Jouni J.K. Jaakkola, Simo Näyhä
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TEMÁTICA	Temperatura

JOURNAL OF AGROMEDICINE

ARTÍCULO 16: Human Health Surveillance During Animal Disease Emergencies: Minnesota Department of Health Response to Highly Pathogenic Avian Influenza Outbreaks, 2015 and 2022–2023

Objectives: Highly pathogenic avian influenza (HPAI) poses an occupational risk for poultry workers, responders, and others in contact with infected birds. The objective of this analysis was to describe HPAI surveillance methods and outcomes, and highlight the challenges, successes, and lessons learned during the Minnesota Department of Health's (MDH's) public health response to HPAI outbreaks in Minnesota poultry flocks in the years 2015 and 2022–2023.

Methods: During both outbreaks, MDH staff attempted to contact all potentially exposed people and conduct a standardized interview. People were considered exposed and at risk if they had entered a barn with poultry on any HPAI test-positive premises. With their consent, exposed persons were entered into illness monitoring until 10 days from their last exposure. In 2015, MDH monitored the health of poultry workers only. In the 2022–2023 response, MDH monitored the health of poultry workers, backyard flock owners, responders, and private contract workers. In 2022–2023, interview responses were entered into a REDCap (Research Electronic Data Capture) database in real time, which automatically entered the person into monitoring if they consented. Through REDCap, they received an automated email with a unique link to a short survey asking about any symptom development. Where appropriate, interview responses from poultry workers collected in 2015 were compared to interview responses from poultry workers collected in 2022–2023.

Results: From March 3 to June 5, 2015, MDH epidemiologists interviewed and evaluated 375 (86%) of 435 poultry workers from 110 HPAI-infected flocks. From March 25, 2022 through December 31, 2023, MDH epidemiologists interviewed and evaluated 649 (65%) of 992 poultry workers, responders, contractors, and backyard flock owners associated with 151 HPAI-infected flocks. Among poultry workers, self-reported personal protective equipment (PPE) usage declined significantly from 2015 to 2022–2023 (full PPE usage 51.8% vs. 23.9%, $p<.01$).

Conclusion: MDH's long standing relationships with animal health officials and the poultry industry resulted in strong poultry worker participation rates in surveillance efforts during HPAI outbreaks in 2015 and 2022–2023. Self-reported PPE usage was low, particularly in 2022–2023. Improvements in PPE accessibility and technology are needed to protect workers and responders in the on-going HPAI outbreak.

Vigilancia de la salud humana durante emergencias por enfermedades animales: respuesta del Departamento de Salud de Minnesota a los brotes de gripe aviar altamente patógena, 2015 y 2022–2023

La gripe aviar representa un riesgo para los trabajadores del sector avícola. Este estudio expuso los métodos y resultados de la vigilancia de esta enfermedad animal en la respuesta de la salud pública del Departamento de Salud de Minnesota durante dos brotes en los años 2015 y 2022-2023. Se realizaron entrevistas estandarizadas a los trabajadores que habían estado expuestos, además de ser incluidos en un sistema de monitoreo de la enfermedad. En 2015 hubo 375 participantes y en 2022-2023 un total de 649. El uso de equipos de protección individual fue bajo, principalmente en el último período (2022-23). Se concluyó la necesidad de mejorar las medidas para la protección de los trabajadores.

AUTORES Joni M. Scheftel, Kelly E. Schenk, Leah J. Bauck, Maria L. Bye, Malia J. Ireland, Carrie A. Klumb, Leslie M. Kollmann, Kirk E. Smith, Shauna J. Voss, Brian L. Hoefs, Lucia J. Hunt, Stacy M. Holzbauer

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TEMÁTICA	Accidentes y Enfermedades Laborales

ARTÍCULO 17: Investigation of Observational Techniques Ergonomic Risk Assessment of Work-Related Musculoskeletal Disorders among Farmers - A Systematic Review

Objective: Farming tasks often involve repetitive movements, heavy lifting, awkward postures, and prolonged periods of standing or bending, all of which can contribute to the development of musculoskeletal issues (MSDs) such as back pain, joint pain, and muscle strains. The consequences include decreased work time, disability, and increased financial costs. Various ergonomic risk evaluation techniques have been created for industrial fields, but there is a shortage of specific techniques for farming occupations. This study aims to offer an overview of the observational techniques of evaluate work-related ergonomic risk factors among farmers.
Methods: Articles published beetween Mar 2010 to Nov 2023 were searched in scientific databases such as PubMed, Scopus, and Iranian databases. The Critical Appraisal Skills Program (CASP) was used to evaluate the quality of the articles. We removed unrelated articles using PRISMA statement guidelines and finally examined articles completely related to the study. Additionally, the GraySource and BASE databases were consulted to identify gray sources.
Results: Following three review stages 31 articles were ultimately included in the final analysis. Based on the assessment of article quality using the CASP checklist, the scores of 31 articles ranged from 6 to 10. The REBA stands out as the most commonly used technique. Additionally, sepecific techniques, like AULA, AWBA and ALLA, have been specifically designed to evaluate the ergonomic risk faced by farmers. Most of these techniques are limited to evaluating occupational factors and individual, environmental and psychosocial factors have not been investigated.
Conclusions: Considering the growth of agricultural jobs, it is essential to create new techniques and enhance the current ones. Additionally, given the complex nature of musculoskeletal disorders, it is crucial to take into account multiple factors (individual, occupational, environmental, and psychosocial) when developing risk assessment techniques.

Investigación de técnicas observacionales para la evaluación del riesgo ergonómico de trastornos musculoesqueléticos relacionados con el trabajo en agricultores: una revisión sistemática

Las labores agrícolas requieren movimientos repetitivos, manipulación de cargas y adopción de posturas perjudiciales, lo que aumenta el riesgo de trastornos musculoesqueléticos. Este estudio revisó los métodos de observación que permitían analizar el riesgo ergonómico en trabajadores del sector agrícola. Para ello, se realizó una revisión bibliográfica en la que se seleccionaron y analizaron 31 artículos publicados entre 2010 y 2023. Se utilizaron diferentes bases de datos (PubMed, Scopus y bases iraníes) y literatura gris. Se empleó la declaración PRISMA. Los resultados mostraron que el método de evaluación más empleado fue REBA, aunque también se determinaron técnicas concretas como AULA, AWBA y ALLA. La mayoría de los métodos se centraban en factores ocupacionales, no considerando los individuales, ambientales y psicosociales. Se concluyó la necesidad de desarrollar nuevas herramientas ergonómicas que combinen múltiples factores para analizar los trastornos musculoesqueléticos de trabajadores de la agricultura.

AUTORES	Adel Mazloumi, Bahram Kouhnavard
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TEMÁTICA	Riesgo Físico

ARTÍCULO 18: Development of a Pesticide Labeling Literacy Scale for Thai Rice Farmers: Item Generation and Content Validity Testing

Background: Occupational exposure to pesticides in rice cultivation poses health risks, exacerbated by factors contributing to the improper use of pesticides. One significant factor is the limited literacy skills of farmers, hindering their ability to read and comprehend pesticide labels. Research in this area is limited by the lack of an acceptable method for measuring pesticide labeling literacy.
Objective: The aim of this study was to develop a valid and reliable questionnaire to assess pesticide labeling literacy in Thai rice farmers.
Method: The scale development involved identifying components and dimensions of pesticide labeling, formulating question items, and designing the scale based on literature reviews and expert interviews. The content validity of items was evaluated by experts using the Content Validity Index (CVI) and Content Validity Ratio (CVR). After the pilot test, the difficulty, discrimination index, reliability and construct validity of the scale were examined using exploratory factor analysis (EFA). The confirmatory factor analysis (CFA) was evaluated on 400 rice farmers.
Results: The pesticide labeling literacy scale was structured into five components: Access, Understanding, Awareness, Analysis, and Application. The CVI and CVR results fell within the acceptable range, confirming content validity. After refining the questionnaire based on the pilot test, a 40-item scale was derived, with items exhibiting suitable difficulty indices (0.28–0.76) and discrimination indices (0.20–0.70). The overall pesticide labeling literacy scale demonstrated acceptable internal consistency, with a Cronbach's alpha of 0.896 The exploratory factor analysis (EFA) indicated that the scale was suitable for factor analysis. The results of the confirmatory factor analysis (CFA) demonstrated that the model aligned well with the empirical data and exhibited acceptable fit indices for the proposed model. The final version of the scale comprised 35 questionnaire items.
Conclusion: The 35-item questionnaire is a valid and reliable instrument for assessing pesticide labeling literacy among Thai rice farmers. It encompassed five components: Access, Understanding, Awareness, Analysis, and Application This innovative scale has the potential to serve as an effective tool for evaluating the level of pesticide labeling literacy among Thai rice farmers.

Desarrollo de una escala de alfabetización sobre etiquetado de tratamientos fitosanitarios para agricultores de arroz tailandeses: generación de ítems y prueba de validez de contenido

La exposición a tratamientos fitosanitarios en cultivo de arroz representa un riesgo para la salud de los trabajadores, que se vuelve más grave debido al uso incorrecto de estos productos. Una de las causas es la escasa alfabetización de los agricultores en algunos casos, lo que dificulta la lectura y compresión de las etiquetas. Se diseñó un cuestionario para analizar la alfabetización sobre etiquetado de productos fitosanitarios en agricultores tailandeses de cultivo de arroz. Para ello, se realizaron revisiones bibliográficas, entrevistas con expertos, se evaluó su validez y se realizó una prueba piloto. El cuestionario final (válido y confiable) se compuso de 35 ítems que se dividían en cinco temas: Acceso, Comprensión, Conciencia, Análisis y Aplicación.

AUTORES	Phiranut Saeneewong Na Ayuttaya, Nuttaporn Lawthong, Mark Gregory Robson, Wattasit Siriwong
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TEMÁTICA	Tratamientos Fitosanitarios

ARTÍCULO 19: Mental Health and Wellbeing Helplines for Farmers: A Scoping Review of Usage, Acceptability, and Effectiveness of Those Currently in Operation Around the World

Objectives: Farmers have higher risk of suicide than the general working population but are less likely to seek help from mainstream mental health services. Farmer-focused sources of support such as farmer helplines may be a viable alternative, and several currently operate internationally. However, it is unclear whether these specialized helplines collectively tend to be used and are acceptable or effective in reducing farmers' distress. This review aimed to fill this important knowledge gap.
Methods: The PRISMA 2020 guidelines, in consultation with the extension for scoping reviews, guided the review process. The search included 13 academic databases and grey literature via Google.
Results: The database search yielded 1,337 initial results and a Google search strategy resulted in 620 links to investigate. Data extraction was sought from 28 papers and 332 online links. We identified 35 unique helplines operating across Canada, the United States, the United Kingdom, Ireland, Australia, India, and Austria. Farmers do use helplines when experiencing stress; however, we found little empirical evidence of the acceptability or effectiveness of helplines. Anecdotal evidence suggested farmers are more likely to trust telephone support services operated by people who understand the farming way of life.
Conclusion: Research in this area is scant but promising. Farmers and farming communities will use farmer helplines in times of elevated stress. However, there is a pressing need for more rigorous evaluation studies to determine their effectiveness in this at-risk group. Further, when designing farmer helplines, careful consideration should be given to the extent to which those answering calls understand farming.

Líneas de ayuda para la salud mental y el bienestar de los agricultores: una revisión exploratoria sobre el uso, la aceptación y la efectividad de los servicios actualmente operativos en todo el mundo

Los trabajadores del sector de la agricultura presentan un riesgo mayor de suicidio que la población trabajadora en general, pero no suelen acudir a servicios de salud mental. Se realizó una revisión bibliográfica para analizar si las líneas de ayuda específicas para agricultores eran efectivas para disminuir su malestar. Se emplearon 13 bases de datos y literatura gris, además se siguió la declaración PRISMA. Se encontraron 35 líneas de ayuda en Canadá, Estados Unidos, Reino Unido, Irlanda, Australia, India y Austria. Los trabajadores las utilizaban en momentos de estrés elevado. No se encontró evidencia sobre su efectividad, pero se concluyó que los agricultores preferían servicios telefónicos en los que atendieran personas que conocieran la vida agrícola.

AUTORES	Donna Hughes-Barton, Gemma Skaczkowski, Hannah Starick, Kate M. Gunn
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TEMÁTICA	Riesgo Salud Mental

ARTÍCULO 20: Development and Psychometric Properties of Scale for Safe Pesticide Use Behaviors Assessment Based on the Health Belief Model

Objectives: This study aimed to develop and validate a measurement tool that provides a model-based assessment of health beliefs affecting individuals' safe pesticide use behaviors.

Methods: This study employed a methodological design. The study sample consisted of 701 agricultural workers engaged in pesticide-related work in a district in southern Türkiye. Data were collected using a sociodemographic form and the 42-item draft version of the Health Belief Model Scale for Safe Pesticide Use Behaviors (HeBSaPUB). Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted to determine construct validity. Cronbach's alpha internal consistency and test-retest correlation coefficients were calculated for reliability.

Results: The 39-item HeBSaPUB scale showed good psychometric properties in terms of reliability, content validity, and construct validity. In the EFA, a six-factor structure emerged, explaining 61.36% of the total variance in the measured variables: perceived susceptibility, perceived barriers, perceived severity, perceived benefits, cues to action, and self-efficacy. This structure was confirmed by CFA using a cross-validation approach. Cronbach's alpha coefficient was 0.90 for the whole scale and ranged from 0.81 to 0.92 for the sub-dimensions. The test-retest reliability coefficient values of the scale were between 0.763 and 0.927. The items on the scale were not additive, and each sub-dimension was evaluated independently. An increase in the scores of perceived susceptibility, perceived benefit, perceived severity, cues to action, and self-efficacy, along with a decrease in the scores of perceived barriers, indicated positive health beliefs.

Conclusion: The results of the study demonstrated that the HeBSaPUB scale is a valid and reliable instrument for measuring attitudes and beliefs toward safe behaviors in preventing the risk of pesticide exposure. The HeBSaPUB scale can contribute to identifying needs for health professionals.

Desarrollo y propiedades psicométricas de una escala para la evaluación de comportamientos seguros en el uso de tratamientos fitosanitarios basada en el Modelo de Creencias de Salud

Se desarrolló y validó una escala de medición para evaluar las creencias de salud que influyen en los procedimientos seguros durante el uso de tratamientos fitosanitarios de trabajadores del sector agrícola en Turquía. Se utilizó un diseño metodológico y participaron 701 trabajadores que desarrollaban labores con estos productos. La escala final contenía 39 ítems divididos en seis factores: susceptibilidad percibida, barreras percibidas, severidad percibida, beneficios percibidos, señales para la acción y autoeficacia. Se concluyó que se trataba de una herramienta válida y con alta confiabilidad para medir las actitudes y creencias de los trabajadores hacia comportamientos seguros en la exposición a tratamientos fitosanitarios. Además, puede ayudar a identificar la necesidad de intervenciones a profesionales de la salud.

AUTORES	Adem Sümen, Dilek Ayaz, Selma Öncel
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TEMÁTICA	Tratamientos Fitosanitarios

ARTÍCULO 21: Farm Injury and Safety Practices Among Rural Adolescents: A Qualitative Analysis to Support the Development of a Gamified Educational Resource

Objectives: Little is known about adolescent experiences of injury and adoption of safe or unsafe practices on farms, despite adolescents being at-risk of fatal and non-fatal injuries in the farm setting. To enhance understanding and inform the co-design of farm safety educational materials for teens, we aimed to explore farm injury experiences, safety practices, and educational preferences for secondary school students and their teachers.
Methods: Nine focus groups of mixed gender students (year 7 and 8) and five one-on-one teacher interviews were conducted at three high schools teaching agriculture in rural Australia, across the states of New South Wales and Tasmania. Inductive thematic analysis of session transcripts was undertaken.
Results: Five overarching themes emerged: "safety is not always front of mind"; "farm injuries are commonplace and downplayed"; "learning opportunities"; "school has a role"; and "teach me, but make it realistic and fun". Students indicated injuries were inevitable, and widespread unsafe practices occurred. Farm safety information was received from parents or while on the job, although in some cases parents encouraged unsafe behaviors. Curriculum linked materials are important, yet teachers also saw the value in covering additional material outside of mandated content, as it is often relevant to students' real-life experiences on farms. Students expressed interest in game-based learning on this topic but were adamant it needed to be fun and realistic.
Conclusion: Farm injury is preventable, and opportunities exist to educate adolescents about farm injury prevention via fun and engaging materials delivered at school. Insights from students and teachers around preferred educational design and content have informed the development of the "Calm Your Farm" (www.calmfarm.education) online gamified educational resource and may also be helpful to others working to influence farm safety practices among a typically difficult to engage age group.

Lesiones agrícolas y prácticas de seguridad entre adolescentes rurales: un análisis cualitativo para apoyar el desarrollo de un recurso educativo gamificado

Se analizaron los conocimientos sobre lesiones y prácticas de seguridad de los adolescentes en la agricultura. También se analizaron sus preferencias educativas para formarse en este ámbito. Participaron nueve grupos de alumnos de tres centros de secundaria de agricultura en Australia. Además, se realizaron cinco entrevistas a docentes. Los estudiantes consideraban que las lesiones eran inevitables y que de forma general no se realizaban prácticas seguras. La información provenía de sus padres o del trabajo. En cuanto a su formación en este ámbito destacaron su interés por el ABJ (Aprendizaje Basado en Juegos). Los docentes eran partidarios de incluir contenidos fuera del currículo obligatorio, pero relevantes para la experiencia real de los estudiantes en el sector agrícola. Se concluyó que se puede formar a los estudiantes en la prevención de riesgos mediante materiales atractivos y divertidos en la escuela. Esta investigación apoyó el desarrollo de *"Calm Your Farm"*, un recurso gamificado para explicar este temario a los estudiantes.

AUTORES	Amy E. Peden, Dennis, Tich P. Tran, Rebecca Q. Ivers, Richard C. Franklin
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TEMÁTICA	Formación

ARTÍCULO 22: Assessing the Understandability and Actionability of Education Materials for Agricultural Workers' Health

Objectives: Agricultural health and safety educators, including community health workers and Extension agents, represent an important community of practice, connecting agricultural workers (i.e. migrant and seasonal farmworkers) to health information and care. We sought to identify and evaluate existing education resources available to educators for use in health education and outreach with farmworkers.

Methods: This study used a systemized search process to identify health education materials in English and Spanish used in the United States. Two independent coders coded each material for its understandability and actionability using the Patient Educational Material Assessment Tool (PEMAT). We report descriptive statistics by type of material, topic, and publication date of the material.

Results: We identified farmworker health education materials (n=602) from across the United States. The average understandability score was 86%, and the average actionability score was 76%. Materials were most commonly print material in the format of handouts, brochures, and posters. Some topic areas (e.g. musculoskeletal injuries) had considerably more resources than others (e.g. green tobacco).

Conclusion: This research represents the first, to our knowledge, comprehensive assessment of health education materials for education and outreach to agricultural workers. While the average scores for understandability and actionability were high among materials, there is room to build a stronger set of resources in some topic areas and to modernize materials for electronic delivery. Using PEMAT tools can help the Extension and community health worker communities of practice improve the quality of materials they share with agricultural workers.

Evaluación de la comprensibilidad y accionabilidad de los materiales educativos para la salud de los trabajadores agrícolas

Se analizaron los recursos educativos disponibles para su uso por educadores de seguridad y salud en el sector de la agricultura en Estados Unidos. Se realizó una búsqueda sistematizada y se evaluó la comprensibilidad y accionabilidad de cada uno de ellos mediante la herramienta *Patient Education Material Assessment Tool.* Se identificaron 602 recursos con una puntuación media de comprensibilidad del 86% y de accionabilidad del 76%. Algunas temáticas contaban con un mayor número de recursos, como los trastornos musculoesqueléticos. Además, los materiales más empleados estaban en formato papel (folletos, hojas informativas y carteles). Se concluyó la necesidad de nuevos recursos en algunas áreas temáticas y de digitalizar los existentes.

AUTORES	Julianna Nieuwsma, Joseph G. L. Lee, Jamie E. Bloss, Catherine E. LePrevost, Israel M. Mendez, Emery L. Harwell, Leslie E. Cofie
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TEMÁTICA	Formación

ARTÍCULO 23: Implementation of a Statewide Youth Ag Safety Immersive Virtual Reality Program

Objectives: The purpose of this pilot study was to examine the feasibility and effect of an Immersive Virtual Reality (IVR) Ag Safety Education mail-out program to secondary school-based agricultural education programs. The following aims were addressed: a) develop an IVR Ag Safety game, b) implement a mail-out program for the Rollover Ranch Ag Safety game, and c) evaluate the effectiveness and engagement of an IVR Ag safety program.
Methods: We enrolled 44 schools. Participants were invited to complete a pre- and post-knowledge assessment, and students and faculty evaluations of the experience.
Results: Statistical analysis was completed using an independent t-test. The Pre scores (n=423) had a Mean=72.2% (S.D.=15.2) and Post scores (n=174) had a Mean=79.8% (S.D.=17.2) Post test scores were significantly higher than pre-test scores t (595)=5.36, p<.001, d=0.48. The test questions were then divided into subsets of Tractor Safety, ATV Safety, and Electrical Safety, and all subset scores showed statistically significant increases. The students scored highest on ATV safety, Pre score mean=89.1% (S.D.=17.3) and post score mean=93.1% (S.D.=15.7). Tractor Safety Scores had a pretest Mean=71.2 (S.D. 22.7) and a post-test score mean=78.3 (S.D.=23.4). The lowest performing questions were on electrical safety with a pre-test mean=40.6% (S.D.=37) and a post-test mean=57.2% (S.D.=40.8). The students' evaluations reported the game was entertaining (85.63%) and increased their understanding of Ag Safety (63.8%). Most students (79.64%) wanted to continue to use IVR. The majority of faculty (77%) indicated that IVR assisted in teaching, and 92% indicated they would want to continue using IVR as a teaching modality.
Conclusion: IVR can be delivered to serve all geographical areas, allowing dissemination throughout a rural state. Students learned and were engaged; faculty found it easy to use and both would desire to use it again. Further research is needed, including long-term follow-up on retained knowledge and, more importantly, if it translates into appropriate behavior when operating agricultural equipment and electrical safety.

Implementación de un programa estatal inmersivo de realidad virtual para la seguridad agrícola juvenil

Se desarrolló y evaluó un juego educativo sobre seguridad agrícola basado en Realidad Virtual Inmersiva, que fue distribuido por correo a centros de secundaria con el fin de analizar su efectividad y el nivel de participación. Se facilitó a 44 centros y los participantes completaron una evaluación de conocimientos antes y después de la intervención. También, una encuesta de satisfacción con el recurso dirigida a estudiantes y docentes. Las puntuaciones obtenidas tras la utilización del juego fueron superiores a las iniciales. Las preguntas se dividieron en tres temáticas: seguridad con tractores, seguridad con vehículos todoterreno y seguridad eléctrica. En todas ellas se obtuvo un aumento en la puntuación. Las preguntas mejor contestadas fueron las relativas a vehículos todorerreno. En la encuesta de satisfacción con el juego, los estudiantes indicaron que era entretenido, que mejoró su comprensión sobre seguridad en el sector de la agricultura y que seguirían utilizando dicho recurso. La mayor parte del profesorado creía que facilitaba la enseñanza y manifestó su interés en seguir utilizándolo como material educativo.

AUTORES	Sue Schuelke, Aaron Yoder, Matt Kreifels, Kevin Kupzyk
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TEMÁTICA	Formación

ARTÍCULO 24: A Cross-Sectional Study of Psychological Demands, Decision Authority and Social Support at Work in Norwegian Farmers Compared to Other Major Occupational Groups: The HUNT Study, Norway

Objectives: Farming is an occupation with high levels of occupational stress. The objective of this study was to explore psychological job demand, decision authority, and social support at work in Norwegian farmers compared to other occupational groups.

Methods: Data from the fourth wave of the Trøndelag Health Study (HUNT4) was used, in which participants were registered with their main occupation, and items from the Swedish Demand-Control-Support (DCS) Questionnaire were included to measure self-reported psychosocial work environment. Each DCS dimension was dichotomized into high and low scores. Four job types were created by combining high and low scores of demand and decision authority (active, passive, low and high strain). Logistic regression analyses were used to explore associations between occupational groups and the three DCS dimensions, as well as job type.

Results: Of the 20,268 participants in our sample, 800 were farmers. A small proportion of farmers had a combination of high demands and low decision authority (2.3%). Overall, farmers stood out from the other manual occupational groups with high levels of demand and decision authority. Compared with other main occupational groups, farmers were most similar to managers in terms of having an active job (OR 0.79; 95% CI 0.66–0.94) and a high strain job (OR 0.95; 95% CI 0.57–1.74).

Conclusion: Although having a demanding occupation, the high decision authority experienced by most farmers prevents them from being in the high strain job category. Despite socioeconomic differences, farmers are more similar to managers than they are to other blue-collar workers with regards to psychosocial work environment.

Estudio transversal sobre las demandas psicológicas, la autoridad en la toma de decisiones y el apoyo social en el trabajo en agricultores noruegos en comparación con otros grandes grupos ocupacionales: el Estudio HUNT, Noruega

Se evaluaron las demandas psicológicas relacionadas con el trabajo, la autoridad en la toma de decisiones y el apoyo social de agricultores noruegos, comparándolos con otros sectores laborales. Se emplearon datos del estudio HUNT4 y, para medir el entorno psicosocial, se incluyeron ítems del Cuestionario Sueco de Demandas-Control-Apoyo. La muestra fue de 20268, de los cuales 800 eran agricultores. Estos últimos se diferenciaron de los trabajadores de otros ámbitos por combinar elevadas demandas laborales y alta autoridad en la toma de decisiones, lo que los situaba en un perfil psicosocial activo y más similar al de directivos que al de otros trabajadores.

AUTORES	Jonil Tau Sperstad, Eystein Skjerve, Karianne Muri, Kjersti Selstad Utaaker, Magnhild Oust Torske
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TEMÁTICA	Riesgo Salud Mental

ARTÍCULO 25: "The Hill in Front of You": A Qualitative Study of the Mental Health Impact of Livestock Diseases and Depopulation on Farmers

Background: Livestock disease outbreaks are challenging to control and often lead to animal deaths, sometimes necessitating the mass euthanasia of an entire herd or flock, a process known as depopulation. Depopulation is essential for safeguarding animal welfare, human health, and economic stability, as well as preventing the further spread of disease. While significant advancements have been made in the surveillance, detection, and disposal of affected farm animals, less attention has been given to the impact of livestock diseases and depopulation on farmers' mental health. This study explored the mental health effects of these events on farmers and identified strategies to enhance their resilience in coping with such stress.

Methods: Using a qualitative study, 20 farmers, veterinarians, and industry experts were recruited to describe the experience of livestock diseases and depopulation in Alberta, Canada through semi-structured, one-on-one interviews. All had experience with livestock diseases, and 18 had direct depopulation experience. To capture a broad spectrum of the impact on farmers, we gathered feedback from those raising cattle, swine, poultry, deer and elk, sheep, goats, and bees. The interviews were analyzed using a thematic approach to identify common themes.

Results: Five themes and five sub-themes emerged from the analysis: emotional distress (with sub-themes of shock and helplessness, anxiety and hypervigilance, despondency and waning motivation, fear of judgment and stigma, and contextual variables), threats to identity, economic burden, distrust and frustration with authorities, resilience and adaptation. Using our findings, we adapted the Emergency Management Framework to show what activities could be integrated to support farmers' mental health needs before, during, and after a depopulation event.

Conclusion: Farm animal diseases threaten the livelihoods and well-being of farmers as well as pose a significant threat to Canada's food security and national economy. Our findings indicate farmers who experience livestock diseases and depopulation may be at risk for poor mental health. Implications for education and training, as well as changes to policy to support the mental health and well-being of farmers is discussed.

"La colina frente a ti": un estudio cualitativo sobre el impacto en la salud mental de las enfermedades del ganado y la despoblación en los agricultores

Las enfermedades que sufre el ganado constituyen un grave problema, que en ocasiones tiene como consecuencia la muerte de los animales. Este estudio evaluó la salud mental de los ganaderos ante estas situaciones e identificó las estrategias que podrían mejorar su resiliencia. Se realizaron entrevistas a 20 participantes (ganaderos, veterinarios y expertos del sector) en Canadá, identificando cinco temas principales: estrés emocional, amenazas a la identidad del trabajador, carga económica, desconfianza y frustración hacia las autoridades y resiliencia y adaptación. Los resultados mostraron que los ganaderos expuestos a estas circunstancias están en riesgo de sufrir problemas de salud mental. Se propusieron estrategias para fomentar el bienestar de estos trabajadores.

AUTORES	Rebecca J. Purc-Stephenson, J. Doctor
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TEMÁTICA	Riesgo Salud Mental

ARTÍCULO 26: Sun Protection Knowledge and Behaviors Among Agricultural Industry Workers in Pennsylvania

Objectives: Outdoor occupations like agriculture expose individuals to higher levels of ultraviolet radiation, increasing the risk of skin cancer. Although most individuals in agriculture recognize the importance of sun protection, adherence to preventive measures may be inconsistent. Our study aimed to explore sun protection behaviors among agricultural industry workers in Pennsylvania and identify specific barriers faced in practicing sun safety.

Methods: We conducted a convenience sample survey at the largest indoor agriculture exposition in the country (Pennsylvania Farm Show). The survey, based on established measures, assessed sun protection practices among agricultural industry workers using a 2-page questionnaire covering demographics, sun protection habits, barriers, and skin examination history. Exclusion criteria included not identifying as an agricultural industry worker, age under 18, and inability to read and understand English. Descriptive statistics, chi-squared tests, and multivariable logistic regression, controlling for age, gender, education, skin tone, previous skin cancer diagnosis, and occupational sector, were employed in analysis.

Results: The response rate was 86%, with 7 of 202 surveys excluded (n = 195). Regarding sun exposure knowledge, 63.1% believed their skin cancer risk was higher than indoor workers, and 80.0% perceived unprotected sun exposure as harmful. However, 71.8% reported infrequent sunscreen use. The most common barrier to sun protection was forgetting (49.2%), and 59.0% noted their workplace lacked built-in sun protection. Regression models revealed lower education, darker skin tones, and male gender as significant predictors of underestimating sun exposure risks ($p < .01$). Men were less likely than women to discuss sun protection with their primary care providers, undergo skin checks, or receive sun protection information from healthcare providers ($p < .05$). Additionally, men were less likely than women to regularly wear and reapply sunscreen but more likely to wear hats of any type ($p < .05$).

Conclusion: Despite awareness of skin cancer risk, reported sun protection usage among agricultural industry workers in Pennsylvania was inconsistent, highlighting the need for interventions tailored to addressing barriers like forgetfulness. This study compares sun protection practices between occupational sectors within agriculture. Future qualitative research studies focusing on specific sectors and their unique practices are crucial for developing tailored messaging strategies and targeted, workplace-based interventions.

Conocimientos y comportamientos sobre protección solar entre trabajadores del sector agrícola en Pensilvania

En el sector de la agricultura, los trabajadores se exponen a altos niveles de radiación ultravioleta. Esta investigación analizó los comportamientos relacionados con la protección solar de los agricultores en Pensilvania. Se realizaron 195 cuestionarios que incluyeron datos demográficos, prácticas de protección solar, barreras y antecedentes sobre la piel. Los resultados mostraron que un 63,1% consideraba que el riesgo de cáncer de piel era superior que en trabajos de interior y el 80% reconoció que la exposición sin protección era perjudicial. La mayoría de los trabajadores mostraron un uso poco frecuente de protección solar, siendo el olvido o la ausencia de protección en el lugar de trabajo las causas principales. La falta de información, el tono de piel más oscuro y el sexo masculino se relacionaron con la subestimación del riesgo de exposición al sol. Se concluyó la necesidad de medidas de prevención y formación.

AUTORES	Camille Moeckel, Robert Bower, Calista Long, Hannah Flamini, Amy Longenecker, Elizabeth M. Billingsley, Eugene J. Lengerich, Charlene Lam
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TEMÁTICA	Exposición

ARTÍCULO 27: Effects of a Passive Back-Support Exosuit on Objective and Subjective Measures of Human Performance During a Simulated Bush-Crop Harvesting Task

Objective: Interest in wearable passive back-supports (exoskeletons/suits) has grown rapidly as a tool to reduce the risk of low back injury by reducing lumbar extensor muscle loading. Previous studies have shown the effectiveness of passive back-support exoskeleton/suit at reducing low back muscle activity/fatigue in a variety of tasks, but it is unclear whether an exoskeleton/exosuit intervention would be effective in agricultural harvesting tasks that require complex three-dimensional dynamic motions, long duration stooped postures, and variable engagement of the lower extremities. The objective of the current study was to evaluate the effects of a passive lumbar support exosuit on muscle fatigue and comfort/mobility during a simulated harvesting task in a controlled laboratory setting.

Methods: Sixteen participants were asked to perform a continuous work task that simulated a 3-min bout of harvesting from a bush crop. Participants harvested at a rate of 1 unit per 2 s and were permitted to assume any effective harvesting position except a full kneeling posture. Test contractions and subjective assessments were performed before and after each 3-min bout of a simulated harvesting task to allow for an assessment of the 1) changes in objective measures of erector spinae muscle fatigue development (both time domain and frequency domain measures of muscle fatigue) and 2) subjective measures of physical fatigue, and 3) exosuit comfort and mobility constraints.

Results: The exosuit significantly mitigated the increases in EMG amplitude in the time domain ($p = .015$; Cohen's $d = 0.46$) indicating a mitigation of muscle fatigue, but there was no significant exosuit effect on median frequency ($p = .145$) or perceived fatigue in the low back ($p = .289$). In addition, the exosuit use was associated with significant increases in perceived movement restriction ($p < .001$; $d = 0.82$) which were also manifested in terms of significant effects of the exosuit on the magnitude of the 90th percentile of the trunk flexion ($p = .027$, $d = 0.29$).

Conclusion: The results of this study demonstrated moderate muscle fatigue reduction effects at the cost of a negative impact on objective and subjective measures of trunk motion restrictions and comfort.

Efectos de un exoesqueleto pasivo de soporte lumbar sobre medidas objetivas y subjetivas del rendimiento humano durante una tarea simulada de cosecha de frutos en arbustos

Se analizó la efectividad de un exoesqueleto pasivo de soporte lumbar sobre la fatiga muscular y la comodidad/movilidad durante la labor de cosecha de frutos en arbustos simulada en laboratorio. Para ello, 16 participantes realizaron esta tarea durante tres minutos, recogiendo una unidad cada dos segundos, y adoptando cualquier postura, excepto la posición de rodillas. Se realizaron contracciones de prueba y evaluaciones subjetivas antes y después de cada simulación. Los resultados mostraron que el uso del exoesqueleto contribuyó a una disminución de la fatiga muscular, pero tuvo como consecuencia limitaciones en la movilidad del tronco y en la comodidad.

AUTORES	Sang Hyeon Kang, Emma Wolf, Luke Lowe, Gary A. Mirka
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TEMÁTICA	Riesgo Físico

ARTÍCULO 28: Comparing Humeral Kinematic Variability During Farm Task Performance Between Laboratory and Field Agricultural Settings in Saskatchewan

Objectives: Farmers experience high rates of shoulder injury, necessitating the need to better define the movement demands associated with farm work. Research is needed to determine whether simulating farm work in a laboratory environment will sufficiently capture the movement demands required in authentic agricultural environments. The purpose of this study was to compare variability in farm task performance between laboratory and field locations.

Methods: Inertial measurement units tracked humeral kinematics during four simulated farming work tasks (overhead drill, shovel, climb ladder, seed bag lift) and in three different locations; the laboratory, an agricultural tradeshow ("Ag in Motion"), and individual authentic grain/cattle farms. Ten participants per location were sex and age matched. Mean and peak humeral elevation, mean axial rotation, and peak internal and external rotation joint angles were evaluated for the primary "mover" arm during each of the tasks. Within and between participant variability, as well as differences in task performance across locations were evaluated.

Results: The within variability for peak humeral internal rotation during the shovel task was significantly lower in the laboratory compared to Ag in Motion and the farms ($F_{2,27}=5.59$, $p<.01$, $\eta_2=0.29$). However, within variability was comparable across locations for all other outcomes. Between participant variability was lowest in the laboratory in 12/20 outcomes, lowest at Ag in Motion in 7/20 outcomes, and lowest on the farms in only one outcome, suggesting lower between participant variability in the more highly controlled environments. Finally, significant differences in performance were elicited across locations for the overhead drill, shovel, and climb seeder tasks. Generally, lower humeral elevation and axial rotation occurred in the laboratory environment compared to Ag in Motion or the farms.

Conclusion: Simulating an occupational task in the laboratory may not fully reflect the demands of the task when performed in real-world settings. While greater between participant variability may be unavoidable in-field due to differences in equipment and other environmental variables, the greater humeral elevation and axial rotation demands elicited in the field environments suggest in-field research is necessary to fully capture the complexity of occupational movements.

Comparación de la variabilidad cinemática del húmero durante la realización de tareas agrícolas en laboratorio y en campo en Saskatchewan

Se comparó la variabilidad cinemática del húmero durante la realización de labores agrícolas en laboratorio, exposición agrícola ("Ag in Motion") y en un entorno real en Saskatchewan. Se emplearon sensores inerciales para realizar mediciones a 10 participantes por ubicación en cuatro tareas: taladro por encima de la cabeza, uso de pala, subir escalera y levantar saco de semillas. Los resultados para cada participante fueron similares en cada ubicación, excepto la rotación interna máxima en el uso de la pala, que fue menor en el laboratorio. Las diferencias entre participantes fueron menores en laboratorio, observando una menor elevación humeral y rotación axial que en los otros entornos. Aun así, se concluyó que la investigación en campo era fundamental para considerar la complejidad de las tareas y los riesgos musculoesqueléticos.

AUTORES	Denise Balogh, Loukas Sherlock, Angelica E. Lang
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TEMÁTICA	Riesgo Físico

ARTÍCULO 29: The Most Important Thing is to Know What to Wear When Working in the Sun

Objective: Crop workers face increasingly hot working conditions. Wearing light-colored, single-layer breathable clothing and wide-brimmed hats, on top of having water, rest, and shade, can reduce the risk of heat illness among crop workers. Clothing preferences and limited access may prevent crop workers from wearing optimal work apparel. However, little is known about crop workers' workplace clothing preferences or their clothing acquisition barriers (e.g., access to retailers, cost). This qualitative study aimed to document Spanish-speaking crop workers' ideal work clothing and understand the primary barriers that prevent them from wearing clothing that reduces heat-related illness risk.

Methods: Four focus groups were conducted in Spanish on vegetable farms in Colorado during August and September 2023. Two researchers thematically analyzed qualitative focus group data.

Results: There were 54 Spanish-speaking crop workers who participated in focus groups during August and September 2023. Findings show participants know which work clothing options protect from heat-related illnesses. Participants purchased their work clothes primarily at second-hand stores. They preferred clothes made of light but durable materials and complete pieces that cover the head, neck, and trunk with long sleeves and pants that facilitate movement. Barriers to wearing worker-defined ideal clothing described include costs and the difficulty in finding the specific style of clothing at their preferred retail outlets. Participants described an interest in partnering with employers to purchase ideal clothing to prevent heat-related illness.

Conclusion: Spanish-speaking crop workers have a clear understanding of ideal work clothing and the link between clothing and heat illnesses prevention. However, based on thematic analysis of focus groups with crop workers in Colorado, cost and access to ideal clothing are the biggest barriers. Strategies that facilitate access to appropriate clothing for working in hot environments and involvement of employers in apparel choice are potential methods to promote worker safety and reduce the risk of heat-related illnesses among agricultural farmworkers.

Lo más importante es saber qué ropa usar al trabajar al sol

Se investigaron las preferencias de ropa laboral de agricultores y se identificaron las barreras que les dificultaban usar prendas que disminuyeran el riesgo de enfermedades por calor. Participaron 54 trabajadores hispanohablantes divididos en cuatro grupos en Colorado, durante agosto y septiembre de 2023. Los resultados mostraron que dichos trabajadores conocían la ropa que protegía del calor. Indicaban la preferencia por materiales ligeros, resistentes, que permitieran movilidad y que cubrieran cabeza, cuello, tronco y brazos. Las limitaciones para el uso de ropa adecuada eran principalmente el coste y la dificultad para encontrarla en sus tiendas habituales. Los agricultores presentaron predisposición por adquirir ropa que les protegiera de este riesgo. Se concluyó la importancia de estrategias para facilitar el acceso a ropa adecuada y la participación de los empleadores para fomentar la seguridad y salud.

AUTORES	Whitney Pennington, Yessica Martinez, Kayna Hobbs-Murphy, John Rosecrance, Morgan Valley
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TEMÁTICA	Temperatura

ARTÍCULO 30: Effects of Interventions to Reduce Pesticide Exposure Among Farmers: Application of an Intervention Mapping Approach to Development

Introduction: Considering the intricate complexity of pesticide management, we applied the intervention mapping approach to develop, implement, and evaluate two interventions aimed at improving protective behaviors and the use of personal protective equipment (PPE), thereby reducing pesticide exposure among farmers.

Methods: We used the steps of the Intervention Mapping (IM) process. First, a needs assessment was conducted, including a case study and a cross-sectional survey. Subsequently, the program outcomes and change objectives were specified. This was followed by program design and program production focusing on creating a culturally appropriate program. Finally, we conducted a three-armed randomized trial: 201 farmers were equally assigned to 1) education-only (n=67); 2) education plus PPE provision (n=67); or 3) control (n=67) groups.

Results: Repeated-measures ANOVA revealed group × time interaction for acetylcholinesterase (AChE) activity was significant (p=.001). There was significantly increased AChE activity in the two intervention groups compared with controls (education-only p=.037; combined p=.001), with no between-intervention difference (p=1.00). For protective behavior, both interventions did better than the controls (p=.001 for both), and self-reported use of PPE revealed the combined intervention did better than education-only (p=.030).

Discussion: Our results showed both interventions improved outcomes. Given its lower cost and high feasibility, educational intervention seems particularly suitable to more widespread use in farmer health programs.

Efectos de intervenciones para reducir la exposición a tratamientos fitosanitarios entre agricultores: aplicación del enfoque de mapeo de intervenciones para su desarrollo

Se desarrollaron, implementaron y evaluaron dos intervenciones para mejorar los comportamientos de protección y el uso de equipos de protección individual (EPI) durante la exposición de los agricultores a tratamientos fitosanitarios. Se llevó a cabo una evaluación de necesidades, se definieron los objetivos y resultados del programa, además de su diseño y producción. Posteriormente, se realizó un ensayo con 201 agricultores divididos en tres grupos (educación, educación y uso de EPI y grupo control). Ambas intervenciones mejoraron los resultados, pero la educativa podía emplearse para programas de salud en agricultores debido a su bajo coste y alta viabilidad.

AUTORES	Akram Karimi-Shahanjarini, Mohammad Javad Assari, Jalal Poorolajal, Forouzan Rezapur-Shahkolai, Maryam Afshari
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TEMÁTICA	Tratamientos Fitosanitarios

ARTÍCULO 31: Assessing U.S. Media's Reaction to a Suggested Terminology Shift from "Accident" to "Incident" in News Reports of Childhood Agricultural Injury: A Pilot Study

Objectives: This pilot study aimed to: 1) quantify the usage of "accident" and related terms in media articles describing agricultural injuries and fatalities involving children; and 2) assess journalists' reactions to a suggested terminology shift from "accident" to "incident" in recent U.S. news media reports about youth agricultural injuries.
Methods: United States (U.S.) news reports covering agricultural injury events were obtained from the AgInjuryNews.org dataset. Quantitative text analysis was performed to identify news articles that mentioned "accident" or related terms (e.g., "accidental," "accidentally") in their title or narrative. Chi-square tests, post-hoc procedures, and univariate logistic regression were used to determine whether and to what extent "accident" and related terms were used to describe youth agricultural injuries. To assess journalists' reactions to using "incident" instead of "accident" when describing youth agricultural injuries, a one-question survey was emailed to authors of news reports. Qualifying articles in the AgInjuryNews.org database were from June 1, 2022, to February 28, 2023, describing an agricultural injury involving victims under the age of 18 and featuring "accident" or its variations. Responses were coded based on sentiment.
Results: A total of 3,675 U.S. media reports were included in the quantitative text analysis for aim 1. "Accident" or related terms were used in 66% of the articles about youth agricultural injuries, compared to only 53% for reports about adult agricultural injuries. Agricultural injury events involving youth were more likely to be described using "Accident" or derived terms in U.S. news media than incidents involving adults (odds ratio: 1.73). For the second aim, 31 articles met the inclusion criteria for the journalists' survey. The survey response rate was 39% (n=12). Of the 12 journalists who responded, 1 disagreed with the proposed terminology shift, 5 were neutral, and 6 were in agreement.
Conclusion: The findings from the quantitative text analysis and survey results support the need for additional research and provide evidence to support efforts to create lasting change in the way youth agricultural injury and fatality events are reported by U.S. news media.

Evaluación de la reacción de los medios estadounidenses ante la sugerencia de cambiar la terminología de "accidente" a "incidente" en los informes de lesiones infantiles en agricultura: un estudio piloto

El objetivo de este estudio piloto fue cuantificar el uso del término accidente en artículos de medios de comunicación estadounidenses centrados en lesiones y muertes infantiles en agricultura. Además, se evaluó la reacción de los periodistas ante la propuesta de cambiar este término por "incidente" en dichos informes. Se revisaron 3675 documentos de la base de datos AgInjuryNews.org, que correspondían al período entre el 1 de junio de 2022 y el 28 de febrero de 2023, para identificar la palabra "accidente". También se realizó una encuesta a sus autores para conocer su opinión sobre el cambio por el término "incidente". Los resultados mostraron que en los artículos sobre lesiones infantiles se empleaba más "accidente" que en las lesiones de adultos. De los 12 periodistas que respondieron la encuesta, 6 estaban de acuerdo con el cambio de terminología.

AUTORES	Christopher P. Benny, Jakob Hanschu, Scott Heiberger, Barbara C. Lee, Bryan Weichelt
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TEMÁTICA	Seguridad y Salud General

ARTÍCULO 32: An Investigation of Health Literacy & Cancer Screenings in Agricultural Workers

Objectives: Agricultural workers may experience various health problems as a result of exposure to toxic substances, particularly to pesticides. Adequate health literacy is necessary to protect and enhance the well-being of agricultural workers. Agricultural workers have a poor rate of participation in cancer screening. This study aimed to explore the relationship between health literacy levels and participation in cancer screening among agricultural workers.

Methods: This descriptive study was conducted with 340 agricultural workers between December 2023 and May 2024. The data were collected through face-to-face interviews using the Descriptive Characteristics Questionnaire, Turkey Health Literacy Scale-32 (THLS-32), and Cancer Screening Participation Status Questionnaire.

Results: Participants were found to have a 32.6% adequate health literacy level. In this study, of the female agricultural workers, 37.3% had HPV DNA testing, 35.7% had mammography, 56.7% performed breast self-examination, and 26.3% had clinical breast examination. Among the participants, 27.6% participated in the fecal occult blood test and 21.1% in colonoscopy. An urologist examined 38.8% of male agricultural workers, and 34.9% had their prostate specific antigen levels checked. The health literacy levels of individuals who were older, female, single, of lower education level, had more annual working time and daily working hours in agriculture were significantly lower. A statistically significant relationship was found between participants' status of performing breast self-examination or participating in prostate cancer screenings and their health literacy levels.

Conclusion: Two-thirds of agricultural workers did not have adequate health literacy. The percentage of participants who took part in cancer screening did not exceed one-third. Therefore, qualitative studies should be conducted to investigate why agricultural workers do not participate in cancer screening initiatives to increase health literacy should be planned, and cancer screening should be recommended to agricultural workers by health professionals. Furthermore, future efforts to improve the health literacy of agricultural workers should focus on target individuals who are older, female, single, of lower education level, and more experienced (more daily working hours and years) in agriculture.

Investigación sobre la alfabetización en salud y las pruebas de detección de cáncer en trabajadores agrícolas

Se analizó la asociación entre alfabetización en salud y participación en pruebas de detección de cáncer en trabajadores del sector de la agricultura. Se realizaron entrevistas a 340 agricultores, de los que solamente el 32,6 % tenía un nivel adecuado de alfabetización. Además, se encontró una relación significativa entre el nivel de alfabetización y la realización de autoexploración mamaria o pruebas de cáncer de próstata. Se concluyó que dos tercios de los trabajadores carecían de alfabetización en salud y que apenas un tercio participaban en pruebas de detección de cáncer.

AUTORES	Irem Huri Karabiyik, Aysegul Ilgaz
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TEMÁTICA	Accidentes y Enfermedades Laborales

JOURNAL OF OCCUPATIONAL HEALTH

ARTÍCULO 33: Work-related musculoskeletal disorders among various occupational workers in India: a systematic review and meta-analysis

Objectives: Work-related musculoskeletal disorders (WMSDs) are among the most common occupational diseases, affecting various sectors such as agriculture, small-scale industries, handicrafts, construction, and banking. These disorders, caused by overexertion and repetitive motion, lead to work absenteeism, productivity loss, and economic impacts. The aim of the study was to determine the magnitude of musculoskeletal disorders among different occupational workers in India.

Methods: We identified studies reporting the prevalence of WMSDs using the Nordic Musculoskeletal Questionnaire in different databases between 2005 and 2023 through searches on SCOPUS, PubMed Central, and Google Scholar. The required information was then extracted. A random effects model was used to pool estimates of prevalence with 95% CIs. Publication bias was assessed by applying funnel plots.

Results: The 12-month prevalence of WMSDs was reported across several occupational groups, and the meta or the pooled prevalence was estimated as 0.76 (95% CI, 0.70 to 0.82) along with substantial variability in the prevalence estimates between different industries and studies. The meta-prevalence for low back pain was estimated as 0.60 (95% CI, 0.54 to 0.66). The meta-prevalence for neck pain was estimated as 0.40 (95% CI, 0.34 to 0.47) whereas for shoulder pain it was estimated as 0.36 (95% CI, 0.30 to 0.42), respectively. The risk of bias was statistically nonsignificant, and overall publication bias was low as per visual inspections from funnel plots.

Conclusions: WMSDs are prevalent across various Indian industries in significant proportions, particularly in agriculture, health care, and mining, leading to significant productivity loss and economic impact. The variation in prevalence highlights the need for sector-specific interventions. Addressing WMSDs requires comprehensive ergonomic and policy measures. Effective strategies are essential to mitigate these disorders' widespread impact.

Trastornos musculoesqueléticos relacionados con el trabajo en distintos trabajadores en India: revisión sistemática y metaanálisis

El objetivo de este estudio fue analizar los trastornos musculoesqueléticos (TME) de origen laboral en trabajadores de diferentes sectores en India. Se revisaron las bases de datos Scopus, PubMed y Google Scholar entre 2023 y 2025. Los resultados mostraron una alta prevalencia de TME en diferentes sectores, siendo la agricultura uno de los principales, junto con salud y minería, lo que conducía a una menor productividad y consecuencias económicas. Se concluyó la necesidad de medias ergonómicas y políticas para la prevención de estos riesgos.

AUTORES	SukhDev Mishra, G Avinash, Madan G Kundu, Jyotsna Verma, Ankit Sheth, Abhijit Dutta
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