



“The body is tired of so many pills”. Use and abuse of medications and drinks in agricultural communities in Escuintla, Guatemala

Diana Gómez-López^{a,*}, Fernando Orozco^b, Sandra Herrera^c, Melissa Esteban^a, Berta Sam-Colop^d, María Pedroza^d, Miriam de León^b, Sylvie Pouit^b, Reinaldo Ortuño^a, Lindsay Salem-Bango^a, Iza Ciglenecki^e

^a Médicos Sin Fronteras, Fernando Montes de Oca 56, Colonia Condesa, Cuauhtémoc, Ciudad de México, 06140, Mexico

^b Médicos Sin Fronteras, 4 Avenida, 5-133 B, Zona 0, Chipilapa, La Gomera, Escuintla, Guatemala

^c Universidad de San Carlos, Guatemala, 11 Avenida, Ciudad de Guatemala, Guatemala

^d Ministerio de Salud Pública y Asistencia Social de Guatemala, 6a Avenida 3-45, Zona 11, Ciudad de Guatemala, Guatemala

^e Médecins Sans Frontières, Route de Ferney 140, Geneva, 1202, Switzerland

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ABSTRACT

Introduction: Medication and energy drinks are commonly used for improving work performance among agricultural workers, who face precarious conditions in Guatemala. Médecins Sans Frontières intervened in Escuintla to develop a comprehensive model to address chronic kidney disease of non-traditional causes (CKDnT), highly prevalent in this context. During the intervention, widespread use of medications, carbonated beverages and energy drinks was documented.

Methods: A qualitative study was conducted to explore social and cultural aspects of this practice. 38 semi-structured interviews and 7 focus group discussions (FGD), using pile sorting strategy, were conducted. Participants included community members and leaders, workers and health staff. Interviews were audio-recorded, transcribed and systematized using NVIVO for thematic analysis.

Results: Findings reveal widespread daily use of substances, such as carbonated beverages, energy drinks, and medications, used to manage pain, gain energy and rest. Initially common among young male agricultural workers, this practice has extended to other community members and daily life activities, like chores, recreation and school.

Participants mentioned health risks, including overdoses and CKDnT, as well as risks based on popular beliefs, like *empacho* (indigestion). To mitigate perceived harms participants mentioned purges or intense physical activity to “burn off” substances.

Conclusion: This practice is deeply embedded within community life, influenced by the dependance on agricultural work. The widespread use of substances has a perceived impact on the overall health of the population. Educational strategies are needed to raise awareness of the risks of medications and beverages, however structural factors that underline this practice must also be addressed.

1. Introduction

The use of pharmaceutical medications and other functional beverages and supplements to enhance working abilities is becoming increasingly common in different contexts, reflecting a broader global expansion of access to these products and a popularization of their effects in productivity. For example, the use of nootropics, or “smart drugs”, has been described among young populations to enhance

cognitive abilities for study and work (De Castro & Brandão, 2020; Malík & Tlustoš, 2022). Other authors have reported the use of tramadol and nonsteroidal anti-inflammatory drugs (NSAIDs), to enhance performance in different industries, such as transportation, construction and textile production (Abd-Elkader et al., 2020; Madukwe & Klein, 2019). This practice has also been documented among agricultural and farm workers in Thailand (Abd-Elkader et al., 2020; Alhassan, 2022a; Luanghirun et al., 2017; Madukwe & Klein, 2019; Rossignol et al., 2009;

* Corresponding author.

E-mail addresses: dianasogl@gmail.com, MSFCH-Mexico-QRManager@geneva.msf.com (D. Gómez-López).

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Saapiire et al., 2021; Yucumá et al., 2021) and Ghana (Saapiire et al., 2021). These practices can be understood as a pharmaceuticalization of life, as some authors have proposed to explain the increasing use of pharmaceutical resources, especially medication, to address social, behavioral or bodily needs (Bell & Figert, 2012; Camargo Jr, 2013). These practices may vary across communities due to differing social and economic circumstances, therefore case studies are essential to identify local variations and guide targeted health interventions.

This widespread consumption carries significant public health implications, as the overuse of these substances may increase risks for multiple health conditions, including chronic complications. Evidence has shown that, while tramadol has a low abuse potential (Miotto et al., 2017), its overuse can have important health effects, like tachycardia, hypertension, gastric irritation, anxiety and central nervous system depression (El-Hadidy & Helaly, 2015; Miotto et al., 2017; Nakhaee et al., 2021). Energy drinks consumption has also been associated with adverse effects, including gastrointestinal and cardiovascular complications, insomnia and dependency (Antonio et al., 2024; Costantino et al., 2023; Visram et al., 2016). NSAIDs abuse also has health implications, such as gastrointestinal bleeding, cardiovascular complications and nephrotoxicity (Bindu et al., 2020; Correa-Rotter et al., 2014).

Chronic kidney disease of non-traditional causes (CKDnT) is a variation of chronic kidney disease (CKD) that does not show the same risk factors, such as diabetes, hypertension or obesity (Wesseling et al., 2020). CKDnT is more common among young men (Laux et al., 2016; Wesseling et al., 2020), and linked to working conditions in agriculture, like heat stress, dehydration, agrochemical and pesticides exposure, extremely physically demanding activities and chronic fatigue (Arroyo et al., 2023; Courville et al., 2022; Garcia et al., 2020; Holliday et al., 2022; Keogh et al., 2022; Kierans, 2019; Laux et al., 2016; Luyckx et al., 2017; Ordunez et al., 2018; Wesseling et al., 2020). The consumption of steroidal anti-inflammatory drugs, NSAIDs, antibiotics, high-sugar beverages and diuretics, has been documented as probable contributors for CKDnT (Correa-Rotter et al., 2014; Kaufman & Elinder, 2012; Wesseling et al., 2020).

CKDnT has been documented to a greater extent in agricultural communities in Central America (Arroyo et al., 2022; Flood et al., 2020; Laux et al., 2016), causing more than 20,000 deaths in recent years in the region (Garcia et al., 2020). In Guatemala CKD and CKDnT are major public health issues (Garcia et al., 2020; Laux et al., 2016), with an increasing prevalence over the last years. CKDnT has particularly negative impacts on communities where there are significant challenges to access of health services (Bello et al., 2017; Xie et al., 2018), like the rural communities in Guatemala.

Though agricultural work is one of the main economic activities in Guatemala, it is also one of the worst paying industries in the country (Ministerio de Agricultura, Ganadería y Alimentación, 2022) even when its characterized by its high performance demands (Cerón, 2020; Flores, 2022; Herrera, 2016; Linares et al., 2016; Prado-Córdova, 2020). Poverty, poor labor conditions and inadequate compliance of health insurance requirements compromise agricultural workers' health (Cano, 2018; Cerón, 2020; Linares et al., 2016). Limited job alternatives in rural areas (Flores, 2022), combined with significant economic and educational barriers, constrain an individual's opportunities (Abramo, 2022). Precariousness in agricultural communities creates insecurity for agricultural workers and their families (Flores, 2022; Kierans, 2019), contributing to the poverty cycle (Abramo, 2022).

In Guatemala, practices of self-medication are common (Mejía, 2020; Moreno et al., 2020; Svenson et al., 2021; Tzunum, 2022; Xajil et al., 2024), especially documented in the use of antibiotics (Moreno et al., 2020; Ramay et al., 2016; Svenson et al., 2021). This phenomenon can be related to the lack of accessibility to health services, especially in rural areas (Ramay et al., 2016) and a regulatory framework that, while evaluating the selling of medications according to their safety (Acuerdo Gubernativo No 712-799, 1999), does not mandate the presence of

pharmaceutical staff in pharmacies (Ramay et al., 2016). Within these settings, authors have specifically reported the use of painkillers, vitamins, modafinil, benzodiazepines and energy drinks among agricultural workers to enhance working performance (Arroyo et al., 2022; Herrera-Ruiz, 2020).

Médecins sans Frontières (MSF) intervened during 2021 – 2023 in La Gomera, Sipacate and La Democracia, in Escuintla Guatemala, one of the departments with higher prevalence of CKD and CKDnT in the country (Laux et al., 2016). The aim was to provide a comprehensive model for CKDnT care and prevention. MSF focused its intervention on agricultural workers and other community members who might have kidney malfunction. During MSF intervention, health promotion and medical teams identified a widespread consumption of potentially nephrotoxic substances (PNS) such as analgesics, NSAIDs, and energy drinks. This practice was observed mainly among agricultural workers to manage pain and enhance performance; however, it also extended to other labor sectors such as transportation, the food industry and domestic work, as well as students and the broader community. MSF teams also noted the wide availability of medications and energy drinks in local stores and in informal markets.

A significant gap remains in understanding how these consumption patterns are socially constructed within Guatemalan agricultural communities. To address this, an anthropological study was conducted, as a qualitative approach is suited to identify and describe the local meanings, social norms and peer influences that potentially drive this practice among community members. We aimed to examine the practices and perspectives regarding the use of PNS and their relationship with contextual factors among community members in Escuintla. A Spanish translation of this article is provided in Supplementary File 1.

2. Methodology

An applied qualitative methodology, grounded in a constructivist paradigm, was utilized to delve into the perspectives and practices of community members. This approach allowed us to capture the socially constructed meanings towards the use of PNS. Interviews, focus group discussions (FGD) and ethnographic observation were selected as data collection techniques.

The drug bag method, adapted from the pile sorting technique, was used to stimulate conversation during interviews (Dixon et al., 2019). To apply this method, a standardized set of 14 images of medications and beverages were printed on cardboard and later used during all interviews and FGDs. These images were selected based on the items most frequently mentioned by MSF patients during consultations or health promotion activities. Images were presented to participants and data collectors invited interviewees to interact with them, especially when they were asked to discuss the purposes of medications and drinks, as well as the preferences of participants or other community members. This technique allowed us to establish common references between interviewees and interviewers. To mitigate any potential bias in participant responses, interviewers allowed participants to organically select or point to any specific image, without asking directly about any.

For interviews and FGD, thematic guides were created and adjusted according to the profile of participants. Themes explored included: sociodemographic characteristics; agricultural work dynamics; knowledge and perceptions about medications and beverages; perspectives on use of medications and energy drinks; social representations about CKD; and health promotion and education needs. Nonparticipant observations were carried out at stores, pharmacies and working sites concurrently during interviews, focused on documenting availability and practices of use of medications and beverages. Detailed fieldnotes were taken and used to contextualize findings.

Interviews and FGDs were conducted by authors DGL, FO, SH and MSF health promotion (HP) team members, trained in ethics and qualitative data collection. Interviews were conducted in Spanish and audio-recorded with the consent of participants. Two facilitators led FGDs, one

oversaw record and note-taking, the second led the debate. Interviews and FGDs were held at the time and place most convenient for participants.

Audio-recordings of interviews and FGD were verbatim transcribed by research team members. Transcriptions were checked with the audio-recordings for accuracy and to solve any questions regarding colloquial expressions. Periodic meetings were held among the data collection team to ensure the quality of the information. Meetings also allowed discussions on the findings and their implications for health promotion activities; as well as agreeing on when thematic saturation was reached to end data collection.

2.1. Setting and participants

The study was conducted between October – December 2023 in the three communities where MSF intervened: La Gomera, La Democracia and Sipacate, Escuintla. To represent diverse perspectives, participants were purposively sampled across three main domains: community members and leaders; workers from diverse labor sectors; and formal and informal health care providers. Participants were recruited via a snowball technique, starting with MSF patients and key actors identified by the MSF team. Inclusion criteria included being 18 years or older, residents of the study communities and willingness to provide informed consent. Exclusion criteria included those under 18 years old, inability to provide consent or refusal of both audio-recording and note-taking.

Participants in interviews (38) included: community members (7) and leaders (5 community leaders and 3 teachers); workers from diverse labor sectors - industrial production of soap and salt, construction workers, fisherman, carpenter and drivers- (7); and formal and informal health care providers (3 health post workers, 3 health center workers, 3 specialized health staff, 2 from MSF, 2 health authorities, one traditional healer and one drug vendor). In total, 7 FGD were conducted with community members and leaders (17) and workers from diverse labor sectors (19), including bus drivers and salt workers.

2.2. Analysis

Data was analyzed using a reflexive thematic analysis framework due to its flexibility and versatility to identify patterns and topics among qualitative data (Braun & Clarke, 2019; Paré, 2020). Applied thematic analysis allowed us to delve into the complex relationships among factors that impact the extent of use of PNS among community members in Escuintla (Guest et al., 2012; Paré, 2020).

Codes were initially created following the topics defined in the interviews and FGD guides. After familiarization with transcript and fieldnotes, codes were applied to the dataset based on recurring patterns using qualitative data analysis software NVIVO. Analysis was conducted in Spanish by authors ME and DGL. Themes for analysis included: substances used, availability, motivations, effects perceived, practices of use, work culture, and perceived health risks.

2.3. Ethical consideration

The study was conducted following the Ethical Principles for Medical Research Involving Human Subjects of the Declaration of Helsinki of the World Medical Assembly (WMA). It was approved by the Ethics Committee of Médecins Sans Frontières and the National Health Ethics Committee of the Ministry of Public Health and Social Assistance of Guatemala.

Prior to conducting data collection, participants provided informed consent to record the conversation. No identificatory data of participants was recorded, only information related to their profile (type of participant, occupation and gender). All recordings and transcripts were identified with an alpha numeric code. All data was kept under password protection on the principal investigator's computer and only shared with team members involved in systematization and analysis.

3. Findings

3.1. Substances used, consumption methods and availability

There is widespread consumption of carbonated beverages (or sodas, as they are popularly called) used as refreshments. During the interviews, it was common for participants to find themselves drinking a soda or for someone to pass by with soda bottles, usually a *Jumbo*, 3-L presentation:

There's a lot of usage [of carbonated beverages], for example in my community, there are families that have low resources, really low ... but on their table, they cannot miss a soda or a Jumbo, even when they eat only beans, cheese and cream, there has to be a Jumbo at the table. – Community leader

The most common [drink] is carbonated beverages. That's the tip of the iceberg, it is something cultural. Here in the hospital the workers drink it at breakfast, it is rooted everywhere. And the same for the men who work in the heat, who would not like a cold beverage? – Specialized health staff

Where I work, I give people five years before they develop kidney disease. You see poor people, with a lot of land but no money, at noon everyone is carrying their Jumbo. One year-old babies have baby bottles full of Pepsi, kids have candy and Pepsi for breakfast ... 12–13-year-old lads, patojos, with their energy drinks and 18 year-old people with their Raptor and tramadol ... – Teacher

Besides sodas, participants reported a high consumption of energy drinks, usually to enhance performance rather than to calm thirst:

I know about Raptor, a beverage and now there's even gum. That beverage is used not only by workers, but among young people ... they feel down, de bajón, as they say, and need something to wake up, so they go and buy their Raptor. – Community leader

You feel your body ... your eyes are wide open, no fatigue, no sleep ... I drove all the way there and then back here and nothing [no tiredness]. Does it work? Yeah. But with moderation. – Driver

The range of energy drinks available in the area is wide. However, there is a consensus that *Raptor*, a Guatemalan brand, is the most popular, as mentioned by one community leader: *Because it is cheaper and the presentation is smaller, and it is affordable*. This brand is available in a variety of formats available for purchase, including cans of 300 or 473 mL (ml) or bottles ranging from 600 ml up to 1500 ml.

Even though energy drinks are popular, participants agreed that the use of medications is even more frequent in the area. Tramadol, ibuprofen and acetaminophen were the most mentioned. Table 1 synthesizes these medications according to their perceived or functional uses reported by participants.

Knowledge of their effects and use of analgesics is very common among community members. Participants agreed that when any discomfort is experienced, purchasing them directly from pharmacies without a prescription from a health professional is usual:

Anyone here knows how to manage pain ... and they use it [tramadol], even injected steroids. They are not like "Oh, my little pill". No, they use strong [medications] for months and years. – MSF Staff

However, while some substances are formulated for specific effects, the participants mentioned different expected results. Such is the case of benzodiazepines, originally formulated as central nervous system depressants, or tramadol, an opioid formulated to treat pain; both perceived as energy enhancers and are used to increase work performance.

Even when they were usually mentioned for pain management, some participants did indicate the constant use of acetaminophen, ibuprofen and aspirin for cold symptoms. Although less frequent, participants also mentioned using psychostimulants, appetite suppressors and even

Table 1
Medications and beverages reported^a.

Perceived or functional use	Common names/brands	Substance	Type
Painkillers	Ibuprofen		Nonsteroidal Anti-inflammatory Drugs
	Diclofenac		
	Caplin	Acetaminophen	Analgesic
	Acetaminophen		
Energy enhancers	Aspirina	Acetylsalicylic acid	Salicylate
	Aspirina Forte	Acetylsalicylic acid + caffeine	
	Tramal	Tramadol	Opioid
	Tramadol		
	Acción plus	Acetaminophen + caffeine	Analgesic
	Sin sueño	Caffeine + thiamine	Energizing supplement
	Cerebrol	Piracetam	Nootropic
	Axcion	Phentermine	Appetite suppressor
	Naloxone		Opioid antagonist
	Alprazolam		Benzodiazepines
Restorative	Diazepam		
	Beta 2 Pan	Bisphosphonate + betamethasone propionate	Corticosteroid with anti-inflammatory effects
	Raptor	Energy drinks (taurine, caffeine, ginseng extract, guarana and B12 complex)	Beverage
	Amp		
	Adrenalina		
	Coca Cola	Carbonated drinks	
	Pepsi		
	Other brands		
	Catosal	Butaphosphan + Vitamin B12	Veterinary drug, formulated as metabolic stimulant
	Complejo B	Vitamins, usually B12	Supplement
	Vital Fuerte		
	Compleben		
	Sueros	Sodium chloride + water	Intravenous injection

^a “Perceived or functional use” is included as mentioned by the participants, uses are not necessarily aligned to pharmaceutical or clinical recommendations; “Common brands and names” were the ones mentioned by participants; “Substance and Type” refers to information collected by researchers.

veterinary drugs. To a lesser extent, the use of drugs such as marijuana and cocaine among agriculture workers was also mentioned. Some reported that, due to the expected effect of medications, there is a constant search for better formulas or resources among people, as one participant noted:

About three months ago there was a rumor going around that there was a pill that worked better, and they were selling each pill for 8 quetzales, I had several workers who brought it and I was curious because they made it infamous, and it turned out that it was Oxycodone. I had seen Methadone being brought here ... the seller carried 10 or 12 boxes, I don't know where they got them. – Supervisor of factory

Another common practice referred by participants was the use of saline solutions intravenously, or *sueros*, used among agricultural workers either before or during the harvest season to promote recovery. To receive *sueros*, people visit one of the many pharmacies in the area where storekeepers, who are not necessarily health professionals, administer it intravenously. Another alternative is for nurses, who are also members of the community, to intravenously apply *sueros* in private households.

Oral ingestion of pills is not the only mode of consumption. Some participants mentioned that tablets are often crushed or the enteric coating of capsules removed to be inhaled or mixed. Another practice mentioned to enhance effects was the mixing of substances. The *bomba* or *bombazo*, a mix of *Raptor*, tramadol, and other medications were

commonly mentioned. Another combination is the *elote loco*, medications crushed and mixed with toothpaste, spread on a cigarette:

We used to mix everything [pointing at images] Adrenalina, Raptor, Coca [Cola], Sin Sueño, tramadol, everything ... we used to buy it and mix it. One blister pack of tramadol, capsules, and Caplin ... all crushed, we also added three or five Sin sueño [pills], supposedly for more energy, but no, what it does is make your heart race ... people call it Bombazo, because it has a lot of things. – Construction worker

A cigar with a Sin Sueño [pill]. Elote loco ... you bite the pills until it is a paste. Then, you put it on the cigar around it and then smoke it. – Carpenter

Advertising for various medications and beverages occupies much of the landscape in the area. In urbanized areas, there is a large presence of the country's most important pharmaceutical chains stores. Neighborhood stores, both in urban centers and in villages, are located on every street corner. In both stores and pharmacies, the offering of medications and energy drinks is wide. Selling over the counter without a prescription and by the individual pill or blister is the most common way of acquiring any medication in the area. Vendors not only supply medication but also provide advice to buyers:

If they tell me they have pain, I give them analgesics, pills or injections, whatever they want. – Drug vendor

You go and tell them [to vendors]: “I'm in pain”, “Here, a steroid”. And they [buyers] use it. For parasites, stomachache ... steroids. All pharmacies do that, you go there, tell them what's wrong and they will give you medications. – MSF staff

The sale and prescription of medications in community markets and even transportation is common:

A man gets on the bus with his suitcase of pills and starts promoting: “If you take these for three days, your pain will go away forever! And you will be cured”, and they promote it so credibly, “albendazole, vitaflenaco, diclofenac, it will all be good for your kidneys”. It is so interactive and they are such good sellers ... It is available everywhere, and if you buy the box, they give it to you cheaper. People buy it because it is sold there and they can take it at any time. I took one of the boxes they were passing around, and it was ibuprofen. – MSF staff

Agricultural workers can also buy medications from *chamorreros*, as informal vendors are commonly known, people who sell food and beverages inside plantations:

The chamorrero is this person who goes inside [plantations] with carbonated beverages, and sells them these cocktails with medications ... there, where they are working, they sell them a cold Coca-Cola and tramadol for them to keep working. –Specialized health staff

In the stores they [chamorreros] buy [medications] by the bundle, from a warehouse or from a small store they take them to another store. Also, a cart arrives there [near the sugar mill] with a large quantity of medicine that they give to each person and that person goes around selling the medicine. Whoever purchases more supposedly gets a prize, at the end of the season, they [chamorreros] give them [buyers] a small lunch that they can eat ... near the sugar mill. They bring everything, thiamine, injections, all of that. – Community member

Chamorreros have a system of lending medications and beverages, charging workers on pay days. Cost of medications was perceived as low, ranging from 1 quetzal to 7 quetzales a pill (0.12 to 0.89 dollars); or 5 to 22 quetzales (0.64 to 2.00 dollars) for energy drinks, depending on brand and size.

3.2. Users and motivations

Community members mentioned that pain management, a

consequence of strenuous work, is one of the main motivations for medication use among agricultural workers. Several participants mentioned that some medications are used to manage pain or facilitate rest, as two community members conveyed about their husbands:

He takes it [tramadol] because he feels desperate and wants to take some pills, [he says] that he can't handle his body, by taking the pill, he relaxes, and he is no longer tired nor feels pain. - Community member

He takes a lot of tramadol and Sin sueño [pills] ... He comes home tired, arrives around 10 at night and at 4 in the morning he has to go to work ... he was uncomfortable and with a lot of pain, and I asked him "why do you take that?" and he said "it helps me with the pain". I told him that it was going to hurt him and he always replied: "but what else can I do?". - Community member

Another motivation was the perceived ability of these substances to boost productivity, enabling individuals to complete more tasks or work longer hours, to meet productivity demands:

I associate that [medication use] with the fact that they don't have alternatives. I thought if I were in this person's shoes and had to work, there's no other work alternatives, mainly sugarcane or bananas ... [they begin working] at 3 in the morning until 9 at night. And if you are in the shade, you can't stand the heat, you sit and complain. They are under the sun, carrying heavy things and doing it every day. Humanly, it's not possible. But, due to the need for money, you're going to try to complete the job, and what are you going to use to try to do it? Well, numb your body with those combos they make. - MSF staff

We did a screening inside a plantation and someone told me that they have this policy where they reward the person that cuts the most [sugarcane]. That means for someone in need, they don't care about their health, because when they work more, when they cut more, they get more payment ... that's against workers' health, but they don't care if they are sick or not, as long as they are going to be paid more at the end of the day. - Specialized health staff

Women don't take as much medication [as men do], most are men because they are more competitive. In this job, most start using it to improve performance, sadly because of the bonuses they [employees] give them, for spending more time cutting sugarcane or banana. - School teacher

Although findings show that the main motivation for use is to endure long and exhausting workdays among agricultural workers, this practice has expanded to households, schools and other spaces, becoming embedded into community life:

There are women who even take tramadol to do their laundry. My granddaughter was here and she took two tramadol pills ... she is addicted to it ... she also worked [in plantations], and after that she kept taking it, here in the house, for laundry or chores, or when she felt tired, she took it to be calm. - Traditional healer

The one they use the most is tramadol, even if they are sitting with their phones and not going to work, they will have their tramadol. During the day they will be there [relaxing], under the trees, some people playing cards, and they have their Raptor and their pills, at night some of them are in the corner of the health post, some in their homes [taking their pills] ... - Community leader

I was working at a school, and we started searching backpacks before [class] entrance ... it was daily for students to bring Raptor or Adrenaline [inside the schools] ... - Community leader

3.3. The social dimension of use

Participants traced the popularization of these substances back to agricultural plantations, where the use of medications and energy drinks

is officially prohibited but informally promoted. Agricultural workers are usually paid according to individual or team production, so solidarity is needed to guarantee a better income:

What happens is [workers] come here [and tell others]: "look, take this [medication] or you are not going to work as much as others", and someone says "No, I don't do that", but then they don't perform as well as the others, and again the peers will say: "Take it [tramadol] if you want to stay with us, use it or else ..." - They get fired? - Yes, to avoid losing their job they will start using [medications]. - Community leader

Use among young people and adolescents in the community was reported, especially among those who have family members or friends working in the plantations:

I had a student who was in third grade who used to milk cows in the morning and afternoon. His mother [told me] "Sometimes he takes two blister packs of tramadol". He would take a blister in the morning, and in the afternoon another blister. I asked his mother "why?", [his mother answered] "because he has an uncle who works in the banana factory, who gave it [tramadol] to him as a gift once and he milked more quickly. So the next day he did it again and now he takes two blisters a day" ... a lot of the young people in the community do it [use tramadol] guys, patojos, that work on the field, to repair the house ... the kids grow and if they get tired [when working] their friends give them pills for them not to feel sleepy and to have more energy. - School teacher

One day, by chance, a guy who works in the banana field told me: "take one of these [tramadol pill]" and out of curiosity I took one. I liked it and from there I started with one [pill], I went up to five, then twenty, until I took seventy pills a day, seventy pills. When I don't take these, I get cramps and my eye starts to twitch. - Carpenter

Even though there is social acceptance of the use of carbonated beverages, MSF health staff reported that the health promotion messages discouraging carbonated beverages did create a change of attitude among some, leading them to hide its consumption during consultations:

At the beginning I don't think they knew that what they were doing was wrong and they were open to talking about [using medications and drinking energy drinks]. But lately, I would ask: "do you drink sodas?", and they answered: "sometimes, every once in a while", and they laughed. People began to think that it was not good and started to hide ... health promotion campaigns said those were bad practices, so people learned, and they tried to hide it. - MSF Staff

The use of these medications and drinks is normalized when related to work, although some recognize that it can lead to addiction:

Culturally, substance use is normal, it wasn't scandalous to take a blister pack of ibuprofen, a blister of tramadol, or combine it with other substances; for them [community members], it was normal. So, substance abuse was normal for them, so, uh, the overuse of soda in people with diabetes who consume it indiscriminately ... I felt that was the main factor: that they don't know that these kinds of things are bad for their health. - MSF staff

It is such a common practice in the area that it is a theme for casual conversation, jokes and even shown publicly on social networks, as documented by the research team. It was common for participants in interviews or FGDs to mention after the recording had stopped "any pain you might have, it [tramadol] will alleviate it" or "even for a toothache, I have taken it [tramadol]". However, when substances are used outside agricultural work or during resting hours, there is a social sanction that labels this practice as "addiction":

I think it's a vice, because he uses it [tramadol] even for sleep. It's a vice. He can't leave it, even I have scolded him, but he tells me "I can't leave it", and if he says so, he's not stopping. - Community member

It's like a drug for them, their bodies ask for it ... some have told me that they feel like they don't have any strength, energy, or motivation for nothing if they don't take that medication [tramadol], and you can tell, I can see it, my neighbors, they are women who are like that [addicted]. – Health center staff

For me, it is a vice, I'm used to it [using tramadol], without it you feel like you are nothing, it is an addiction for taking so many pills. I would choose [tramadol] a thousand times over food, it's an addiction where you can set aside food and just take the pills. – Carpenter

I don't know what they feel, but they drink it [Raptor] and they are quiet. I know a lot of them, someone would say "go to the store and bring me a Raptor"; and they drink it in, one sitting, not doing anything. It is an addiction to the energy drink ... you get headaches, your hands shake, you don't get any sleep, you are anxious and you don't know what to do. – Community leader

3.4. Health risks and mitigation

Despite perceived benefits for pain management and productivity, participants also mentioned some perceived health risks related to medication overuse. The most common consequence mentioned was acute intoxication, locally termed *pasón*, as described by some:

Body tremors, they can't sleep, they hallucinate, but they say it's because they've consumed too many drinks and pills. – Drug vendor

His looks changed a lot, his body. His skin turned yellow, and he told me: "I'm desperate, I don't know what to do", it even affected his sexual potential. He said he was desperate because he was not the same, "but if I don't take it [tramadol], I feel I'm going to die". He convulsed about 4 times, and even in dangerous places, he was working in an elevated place and fell 3 or 4 m. He hit his head ... another time he was driving his motorbike and convulsed. He doesn't remember what happened to him, when he woke up he was at the hospital. – Community member

You look at him [a neighbor] he buys a blister of Aspirina forte, the strong one, I asked him "Why do you take that", [he answered] "Sometimes I have a lot of pain". I don't know what effect it has, an aspirin and a Raptor, but he takes that and convulses, he even spits blood when he is convulsing. – Community leader

Other participants mentioned deaths among agricultural workers related to substance overuse, especially when medications and energy drinks were not "burned", meaning conducting strenuous physical work to metabolize (or use, as commonly mentioned) the effect of the medication. To manage an overdose, participants mentioned taking bites of a lemon or "letting it pass" in order to let the sickening feelings subside.

Other perceived risks mentioned were the accumulation of pills into the stomach, which some believe contain harmful adulterants like plaster or plastic:

Many have ended up in the hospital because the material in the pill accumulates in their stomach, causing them severe pain and they are operated on to remove the mass. – Community leader

Although there is no direct correlation known, concerns about CKDnT were voiced by some participants, some of them related to their perceived characteristics accordingly to the traditional hot – cold system common in Latin America, where foods, herbs and others are perceived to have inherent thermal qualities that can harm the body when out of balance:

I think it does have collateral damage [the use of medications]. And what it affects most are the kidneys because the medicine is hot, they don't drink pure water, but a lot of soda, so that damages the kidneys. – Community leader

By taking too many pills there is damage to the kidneys, damage to the pancreas, they get a lot of infections, because they are hot, they get urinary tract issues [mal de orín]. Sometimes there is no remedy. – Traditional healer

We have met parents of students who are young and they have to do dialysis because of their kidneys, because they take tramadol ... there are a lot of people in our community that look skinny and yellow, and you will assume they have kidney disease because of all those pills. Some work on the sugarcane [plantation], others on the banana. – Community member

As one participant mentioned, CKDnT, medication and energy drinks consumption has an important impact on communities:

It affects society, communities with weaknesses and needs. People who are sick [with CKDnT] stop being productive, they have to be on treatment and people must find other means of living, because someone who supported the whole family now has kidney disease. So, the whole family paradigm changes, as does life in the community ... someone who used to direct the soccer competitions in the community will not be able to do so because they are sick and their social activities get lost, because there is no one to replace their responsibilities because they have died. – Health authority

To mitigate these perceived risks, participants described various practices such as purging the body of these substances (using laxatives, increasing water intake, or inducing vomiting) and engaging in intense physical activity to supposedly "burn" them out of their bodies:

Epsom salt with sulfate mixed in boiled water, that helps him when he feels his stomach is bloated. – Community member

Many patients think they are empachados [experiencing indigestion], they feel some discomfort, they feel bad and they purge themselves to feel better ... but when they purge, they can have [bouts of] bad diarrhea and even dehydration. – Specialized health staff

As one traditional healer mentioned, *sobar el empacho*, the practice of massaging the body to rid of indigestion is one of the ways to manage excess medications:

The body is tired of so many pills ... The guys in the sugar cane fields would come and tell me "Give me a little massage, I want the pills to come out", one man even had surgery because they found a mass of pills in his stomach. – Traditional healer

4. Discussion

This study aimed to document the perspective of the community regarding the broad use of medications and energy drinks in Escuintla. What we found is that the widespread use of these substances is inextricably linked to the demands and risks associated with agricultural labor, however its reach is beyond agriculture and is deeply embedded within the social and economic lives of the community. Furthermore, these practices are not homogeneous, they are shaped by gender, age and occupational characteristics, creating patterns of use according to the personal needs and expectations of individuals. The overuse of medications and energy drinks; and how the community members perceive it, can be understood as part of a social, economic and cultural process (Breilh, 2013; Campbell, 2011). When discussing the use of medications, energy drinks and other beverages in Escuintla, the structural, community, and individual are deeply connected.

The profound dependence on agricultural labor by workers, their families and the broader community in Escuintla creates impoverished conditions in which the labor market is regulated by neoliberal economic policies (Herrera, 2016). Agricultural workers are characterized as having a basic education level or illiteracy, living in households with more family members compared to the national average, and having

little or no social security coverage (Prado-Córdova, 2020). In Guatemala, most households within rural areas face multidimensional poverty, with up to 80% being below the national poverty line and 40% below the extreme poverty line (Covarrubias & De la O, 2024). The precariousness of agricultural work extends to the overall existence of workers, their families and their communities (Bedoya-Dorado & Maca-Urbano, 2020; Herrera, 2016).

Rural poverty and food insecurity are endemic in Guatemala (Brown et al., 2014; Lane et al., 2024). In Escuintla, where access to pure water for drinking is only available through purchase, sodas seem like cost-effective beverages that not only quenches thirst but also satisfies the senses. Something similar happens with energy drinks, that seemingly has the added benefit of increasing energy to overcome tiredness from their strenuous occupations. According to some data, the consumption of these beverages have exponentially grown in Guatemala since 2013, up to a 20% increase per year (Bolaños, 2015; Portillo, 2018). *Raptor*, like other energy drinks, is composed of taurine, caffeine and other compounds that, in excess, have been shown to cause significant damage to health including severe metabolic disruption, cardiovascular strain and compounded renal stress (Antonio et al., 2024; Ghamlouch et al., 2025). Moreover, the ubiquity of these products reflects the influence of global multinational corporations, a phenomenon often named “Coca-colonization”, where high availability and low cost of carbonated beverages replaces traditional diets and other hydration alternatives (Cassaqui, 2015; Nagata et al., 2011), especially in context where access to safe water for drinking is not guaranteed for everyone, as documented among children in schools in Guatemala (Makkes et al., 2010). This is also evidence of the double burden of malnutrition faced by agricultural communities: while mostly employed in food production, nutritious and rich food is often unattainable due to cost or availability, further exacerbating the risk of chronic diseases (Fenton, 2013; Nagata et al., 2011; SESAN Guatemala, 2024). This paradox is particularly seen in agricultural communities, such as Escuintla, where there is a high productivity of food, yet people simultaneously face accessibility and economic challenges when trying to access a rich, diverse and nutritious diet. Thus, we can understand how these exploitation systems contribute to unequal and unhealthy communities.

In a context like Escuintla, where agriculture is one of the scarce sources of income, the ability to cope with its demands and to be able to withstand labor conditions is key to ensure survival. The use of medications and energy drinks can be understood as ways in which persons manage their bodies and their workforce (Bedoya-Dorado & Maca-Urbano, 2020), especially among agricultural workers as documented by others (Arroyo et al., 2022; Herrera-Ruiz, 2020). For example, the broad use of tramadol, especially related to working abilities, has been documented in other contexts (Abd-Elkader et al., 2020; Alhassan, 2022a; Saapiire et al., 2021; Yucumá et al., 2021). Some authors have reported its increase among the young population (Bassiony et al., 2015; Zabihi et al., 2011). Moreover, its use has also been reported for non-medical purposes, such as a sexual enhancer (Nelson, 2025). The rise in tramadol consumption can be seen as a response to economic challenges, mainly in systems based on exploitation (Alhassan, 2022b), as seen in Escuintla.

Our study found that although agricultural workers were reported as the primary users of medications, this practice has spread beyond this economic activity and has reached other community members who use them to conduct chores in non-agricultural settings. While testimonies identified men as the predominant users of these substances to meet the physical demands of agricultural and other types of labor, use among women was often associated with the compounded burden of underpaid or uncompensated labor of household chores. Furthermore, we documented that children and adolescents were exposed to these practices early in life, inheriting a normalized culture of pharmaceuticalization of everyday activities and labor.

We can understand the extent of the use of medications and energy drinks from a structural vulnerability approach (Quesada et al., 2011),

particularly when agricultural communities in Guatemala are part of an historic process of inequity, poverty and impoverishment that directly affects their lives. As Bedoya-Dorado and Maca-Urbano (2020) have pointed out when researching working and living conditions among sugarcane workers in Mexico, precariousness is installed in subjectivities, embodied, and it goes beyond agricultural work to reach other sphere of the communities. In the absence of adequate conditions that guarantee rest, fair wages, and access to healthcare that can contribute to the overall wellbeing of the population, the use of pharmacological resources has become a normalized strategy for managing the burden of existence in Escuintla. Misuse or abuse of medications can be understood as a way to manage existential pain related to structural causes (Alhassan, 2022b; Madukwe & Klein, 2019), which are especially key when reflecting on the lived experiences of agricultural communities in Guatemala.

Participants discussed perceived and potential health risks associated with this practice; however, in a context where survival is directly linked to the ability to work, any resource, such as medications and energy drinks, is essential. Among health risks, overdose was the most impactful, due to its potentially fatal and immediate outcome. In contrast, chronic risks like kidney damage were perceived as less salient, even when community members do recognize its irremediability. This reflects a temporal trade-off forced upon the community: the immediate, daily necessity of managing pain, assuring work continuity and survival to earn a wage supersedes the long-term threat of chronic illness, like CKDnT.

The high prevalence of CKDnT also influences the perception of the relationship between the disease and the overuse of medications and beverages, as mentioned by one health staff member of the Ministry of Health. While the multi-causal nature of CKDnT makes it impossible to directly link the PNS reported by participants to its high prevalence, this practice may be an important factor in the clinical deterioration of those suffering from the disease (Baker & Perazella, 2020; Krisher et al., 2020). Moreover, although this study was not designed to measure direct impact of the overuse of PNS, nor the prevalence of CKDnT, our findings do reveal the behavioral process that might be contributing to the exacerbated prevalence of this disease. Through MSF work in Escuintla, we have been able to document how the biology of the body suffers the direct consequences of material conditions of life and the dangerous process underlined by work and class. In this context, CKDnT must be understood not only as a biomedical disease but as a manifestation of structural inequalities that permeate all aspects of agricultural communities' lives. Although MSF's intervention in the area aimed to address the symptoms of CKDnT to alleviate the burden on the public health system, reducing the prevalence of this disease ultimately requires dismantling the exploitative labor systems to ensure the well-being of the communities.

Self-medication practices in Guatemala have been documented by some authors, (Mejía, 2020; Moreno et al., 2020; Ramay et al., 2016; Rojop et al., 2024; Svenson et al., 2021; Tzunum, 2022); however research has focused on the use of antibiotics due to its implications for public health. What we document in our study is that the overuse of medications can be understood as an example of the pharmaceuticalization of everyday life, a way of medicalization of existence (Bell & Figert, 2012; Kaczmarek, 2022; Meneu, 2018). Pharmaceuticalization, which is the frequent use of medications without medical prescriptions, especially when used to enhance capacities (Camargo Jr, 2013), can offer an explanation for the use of medication as a response to work-enhancing needs expressed by the participants in our study. This process is heavily fueled by advertising and the networks of formal and informal vendors, both within plantations and across the multiple stores and pharmacies in Escuintla. Similar processes have been documented in other contexts, where overuse of medications can be related to poor regulations (Albarqouni et al., 2023) and high availability of over the counter medications (Bharati et al., 2025). Moreover, Guatemala's regulations on the selling of medications in pharmacies in Guatemala

(Acuerdo Gubernativo No 712-799, 1999; Rojop et al., 2024) do not apply to convenience stores, which are not regulated by health authorities. These are one of the most common places where participants reported that they can purchase any medication.

In Escuintla, the choice of using medications and energy drinks cannot be thought of as only personal preferences, but must be seen as a pattern of socially structured behaviors (Otero & Zunzunegui, 2011) that allow individuals to cope with insecurity and uncertainty, but also mostly with exploitation related to agriculture. Labor precariousness imposes limits on a person's agency and ability to make informed decisions in a context where the availability and necessity for use of medications and energy drink supersedes health services, health promotion and educational strategies. Ultimately, the individualization of suffering and medicalization of existence (Meneu, 2018; Ministerio del Trabajo y Economía Social, 2023) contribute to solving the symptoms, like pain or energy enhancement, without addressing the structural causes of illness, thereby perpetuating inequalities (Halpin & Cortez, 2025). By using medications, people in Escuintla can manage physical or existential pain, but their precarious living conditions, which might be one of the causes of anguish, remain beyond their control.

Despite these structural causes, health promotion strategies remain essential to inform community members about the risks associated with PNS use. Given the social nature of these practices, interventions should target the broader community rather than focusing exclusively on agricultural workers. Furthermore, these efforts must employ non-stigmatizing, harm-reduction communication that acknowledges the structural necessity of these substances. Finally, to amplify the impact of these strategies, health messaging should be culturally aligned with existing local belief systems in Escuintla, such as traditional medicine practices.

Limitations of this study include our convenience sampling, small sample size and the HP team's involvement with participants prior to the study, given MSF's presence in the area, which might represent a bias for data collection. In Guatemala, a context where talking about the precariousness of agricultural work has been historically complex, convenience sampling was a way to ensure willingness to participate due to the trust of participants in MSF. However, MSF affiliation does introduce a potential social desirability bias, in which participants may have shaped their narratives or silence on PNS use practices knowing they were speaking to healthcare providers who have actively campaigned against these behaviors. The diversity of participants and thematic saturation of the topics explored allow us to triangulate and assure consistency of findings, which helps address the limitations of the small sample. The familiarity of the HP team with members of the community was key to enable research due to their willingness to participate and to confidently talk about the topics explored, which also contributed to minimizing response bias.

Although our study presents key findings on the experiences of Escuintla's communities regarding the overuse of medications and energy drinks, further mixed-methods research is needed to better characterize the nature of the relationship between PNS use and CKDnT. This includes studies that integrate individual exposure histories with clinical biomarkers, as well as research that focus on the intersectional socioeconomic factors that drive reliance on these substances.

5. Conclusion

Our findings demonstrate that opioid and other painkiller availability and the massive use of carbonated and energy drinks are highly accepted by the community members in Escuintla. It is impossible to address this practice without considering the complex intersection of economics, accessibility and habits – or addiction. While health promotion strategies aimed at raising awareness about the risks of medication and other substances overuse are much needed, an effective response requires a multisectoral approach that addresses the root causes, including poverty, vulnerability, and poor working conditions

within agriculture communities. This approach will require enforcing existing labor protection, regulating informal pharmaceutical markets and holding agro-industrial corporations accountable for occupational health. Without addressing these structural determinants, medical interventions will remain limited to treating the symptoms of exploitative labor systems rather than truly reducing their impact on people's lives.

CRedit authorship contribution statement

Diana Gómez-López: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Writing – original draft, Writing – review & editing. **Fernando Orozco:** Conceptualization, Data curation, Investigation, Writing – review & editing. **Sandra Herrera:** Conceptualization, Data curation, Writing – review & editing. **Melissa Esteban:** Data curation, Formal analysis, Writing – review & editing. **Berta Sam-Colop:** Conceptualization, Writing – review & editing. **María Pedroza:** Conceptualization, Writing – review & editing. **Miriam de León:** Conceptualization, Supervision, Validation, Writing – review & editing. **Sylvie Pouit:** Conceptualization, Supervision, Validation, Writing – review & editing. **Reinaldo Ortuño:** Conceptualization, Methodology, Supervision, Validation, Writing – review & editing. **Lindsay Salem-Bango:** Formal analysis, Writing – original draft, Writing – review & editing. **Iza Ciglenecki:** Conceptualization, Methodology, Supervision, Validation, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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