

## Research Article

## EFFECTS OF OVER-THE-COUNTER (OTC) MEDICATIONS AND ESTIMATED COST IMPLICATIONS ON RURAL FARM FAMILIES' AGRICULTURAL PRODUCTION IN IMO STATE, NIGERIA

<sup>1</sup>Oparaojiaku, J.O., <sup>2</sup>Akanazu, C.O., <sup>3</sup>Udensi, J.U., <sup>3</sup>Ogwo, U.K., <sup>3</sup>Anyanwu, E.O., <sup>4</sup>Ohiri, J.C., <sup>4</sup>Nwadinigwe, F.C., <sup>3</sup>Kenechukwu, O.Q., <sup>2</sup>Obasi, C.C., <sup>2</sup>Mbanefo, D.N., <sup>5</sup>Osuagwu, I.K., <sup>3</sup>Ajoku, C.U., <sup>6</sup>Ejiogu, C.C., <sup>2</sup>Osumune, A.C., <sup>2</sup>Ejezie, B., <sup>3</sup>Njoku, J.O., <sup>2</sup>Osuoji, J.N and <sup>7</sup>Chikaire, J.U

<sup>1</sup>Department of Agricultural Economics and Extension, University of Agriculture and Environmental Sciences, Umuagwo, Imo State, Nigeria

<sup>2</sup>Department of Public Health, Federal University of Technology, Owerri, Imo State, Nigeria

<sup>3</sup>Department of Environmental Health, Federal University of Technology, Owerri, Imo State, Nigeria

<sup>4</sup>Department of Chemical Pathology, College of Medicine, Federal University of Technology, Owerri, Imo State;

<sup>5</sup>Department of Health Services, Federal University of Technology, Owerri, Nigeria

<sup>6</sup>Department of Environmental Management, Federal University of Technology, Owerri, Imo State, Nigeria

<sup>7</sup>Department of Agricultural Extension, Federal University of Technology, Owerri, Imo State, Nigeria

**Article History:** Received 13<sup>th</sup> March 2026; Accepted 23<sup>rd</sup> April 2026; Published 1<sup>st</sup> May 2026

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### ABSTRACT

The widespread use of over-the-counter (OTC) medications has become a common health seeking behavior among rural farm families in the society. This study seeks to examine the health effects of such behavior on rural farms and the cost implications of seeking behavioral treatment. A total number of 250 farm respondent was randomly selected from 10 communities in Imo State, Nigeria, covering the three Agricultural zones in the State. Questionnaire and oral discussion were used to elicit responses from the respondents. Percentages, means and standard deviation were used to interpret and analyze data. Results showed that the common over the counter medications use includes analgesics and antipyretics (98.0%), cough, cold, and respiratory medications (98%), pain relief (99.2%). Commonly illness treatment includes malaria and febrile conditions (98.8%), body pains (100.0%), headaches (96.4%), respiratory tract infections and cough (99.2%). The reasons for OTC use include limited access to clinics (84.0%), high cost of medical care (96.4), perceived urgency (95.6%), and immediate relief from illness to maintain farm labor (95.2%). Actual effects of OTC include; quick relief of symptoms (M = 2.56), reduced farm absenteeism (M = 2.61), reduced need for hospital visits (M = 2.50), long term health complication (M = 2.59), incomplete treatment of illness (M = 3.01), adverse drug reactions (M = 2.94), among others. OTC influence both farm productivity and labor availability by minimization of work absenteeism (M = 2.94), immediate response to health challenges (M = 3.10), making farm monitoring difficult (M = 2.96), leads to funds mismanagement (M = 3.04), leads to over-use-of family labour (M = 3.06). The following challenges occur lack of proper dosage knowledge (M = 2.64), risk of drug resistance (M=2.70), misdiagnosis of illness (M=2.57), while it is recommended that health education/awareness (M=2.54), improves access to primary health (M=2.61), monitoring and regulation of OTC moderation (M=2.81) should all be carried out.

**Keywords:** Over-the-counter, Drugs, Medications, Cost, Rural, Farm.

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### INTRODUCTION

Over-the-counter (OTC) medications are drugs available without a prescription and are commonly used worldwide to treat minor health issues like headaches, fever, coughs,

and pain. Although they improve access to basic treatment, their misuse has emerged as a significant public health issue especially in low- and middle-income countries such as Nigeria. Evidence shows that people often use OTC drugs improperly for self-treatment, which can lead to

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\*Corresponding Author: Chikaire, J.U, Department of Agricultural Extension, Federal University of Technology, Owerri, Imo State, Nigeria. Email: jonadab.chikaire@futo.edu.ng.

adverse reactions, dependency, and in serious cases, hospitalization or even death (Algarni *et al.*, 2021). This trend underscores the importance of implementing effective public health measures to encourage safer medication practices. In Nigeria, the widespread use of OTC medicines stems from limited healthcare access, the high cost of medical consultations, and insufficient regulatory oversight. Many individuals turn to community pharmacies, patent medicine vendors, and unlicensed sellers to obtain drugs quickly, often without professional advice. Research highlights that analgesics, cough syrups, antihistamines, and antimalarials are among the most frequently misused OTC drugs in the country (Iheanacho & Adam, 2025). These risks are compounded by low levels of health literacy and a general lack of awareness about the dangers of self-medication.

The problem is especially pronounced in Southeast Nigeria covering states like Anambra, Enugu, Imo, Abia, and Ebonyi where high population density, thriving drug markets, and numerous informal pharmaceutical outlets contribute to widespread misuse. Limited access to formal healthcare services further drives residents to treat themselves at the onset of illness. Public health data indicate that inappropriate use of OTC drugs in this region contributes to serious health complications, including drug resistance, organ damage to the liver and kidneys, and the concealment of underlying conditions that require medical diagnosis (Nwokedi *et al.*, 2025). Additionally, the ready availability of medications without prescriptions has contributed to rising instances of drug dependence and abuse, particularly among young people. Cough syrups containing dextromethorphan or sedating antihistamines, for example, are often used for their mind-altering effects. This pattern points to broader systemic challenges, including weak enforcement of drug regulations and a lack of pharmacist-provided guidance during sales (Chinonyerem *et al.*, 2025). These factors highlight the urgent need for coordinated public health efforts to address OTC-related risks. Proven strategies such as public education campaigns, stronger regulation, improved pharmacy practices, and community-based interventions have been shown to reduce misuse. Studies suggest that increasing awareness and curbing unauthorized sales can significantly lower the incidence of harmful self-medication (Algarni *et al.*, 2021). As such, designing and applying focused interventions in Southeast Nigeria is essential to enhancing medication safety and improving overall health outcomes in the region. The study is guided by the following objectives: a). to identify the types of OTC medications commonly used by rural farm families; b). determine the reasons why rural farm families rely on OTC medications; c). examine the effects of OTC medication use on the health status of farm families; d). assess the influence of OTC medication use on farm labor availability and agricultural productivity; e). identify challenges associated with OTC medication use among rural farmers; f). provide recommendations for improving health practices and agricultural output in rural communities.

## MATERIALS AND METHODS

The research was carried out in Imo State, situated in southeastern Nigeria. Established in 1976, the state has Owerri as its capital. Geographically, it lies between latitudes 4°45'N and 7°15'N and longitudes 6°50'E and 7°25'E (Imo State Government, 2023). It borders Abia State to the east, Rivers State to the south, Anambra State to the north, and Delta State to the west (National Bureau of Statistics [NBS], 2022). The climate is tropical, with two main seasons: a rainy period from April to October and a dry season from November to March. Annual rainfall typically ranges from 2,000 mm to 2,500 mm, and average temperatures hover around 26–28°C conditions favorable for agriculture (NIMET, 2021). The natural vegetation belongs to the tropical rainforest belt, supporting a variety of crops such as cassava, yam, maize, cocoyam, and oil palm (Food and Agriculture Organization [FAO], 2020). Farming remains a primary livelihood for rural communities in the state, with many households involved in small-scale agriculture (NBS, 2022). Most farming practices are subsistence-based, relying on family labor and conventional methods (Arene & Mkpado, 2002), making output particularly vulnerable to socio-economic influences like health conditions and household spending.

The study employed a descriptive survey design, which is well-suited for gathering structured data from rural farming families to assess how the use of over-the-counter (OTC) medications and related expenses impact agricultural output. This approach is commonly used in rural and agricultural research involving primary data collection through standardized tools (Arene & Mkpado, 2002). A total of 250 respondents were selected using a multistage sampling method. First, two Local Government Areas were randomly chosen from each agricultural zone. Then, two farming communities were picked from each of the six selected LGAs, resulting in twelve communities. Finally, 250 farm households were selected via simple random sampling. Data were collected using structured questionnaires covering OTC medication use, health outcomes, and indicators of agricultural productivity. Analysis was conducted using descriptive statistics, including frequencies, percentages, and mean scores based on a 4-point Likert scale strongly agree, agree, disagree, and strongly disagree. A mean score of 2.50 served as the threshold for interpreting responses.

## RESULTS AND DISCUSSION

Table 1 showed that over-the-counter medications commonly used by farm families include analgesics and antipyretics (98.0%), anti-malarial formulations (92.0%), cough, cold, /respiratory medications (98.8%), gastro-intestinal medications (79.2%), topical preparations (90.0%), vitamins/mineral supplements (94.4%), antibiotics (94.0%), and Antihistamines (84.0%). Over-the-counter (OTC) medications are drugs available without a prescription and are commonly used by rural farm families to manage everyday health issues. Their widespread use stems from their accessibility, low cost, and simplicity,

especially in areas where healthcare services may be scarce or difficult to reach. These medicines are typically used to treat minor conditions such as pain, fever, digestive problems, respiratory symptoms, and skin ailments. By enabling individuals to address common health concerns on their own, OTC drugs help reduce the need for medical consultations and support basic healthcare needs in remote communities (MSD Manual, 2025; Drugs.com, 2024). Pain relievers and fever reducers are among the most frequently used OTC drugs in rural farming households. Medications like acetaminophen (paracetamol), ibuprofen, aspirin, and naproxen are regularly taken to relieve headaches, muscle aches, joint pain, and fevers symptoms often linked to physical labor or infections. These drugs are not only easy to obtain but also affordable, making them a practical choice in rural areas. Their ability to reduce discomfort and inflammation helps maintain daily productivity among farm workers (Cleveland Clinic, 2024; RxList, 2024).

Respiratory remedies also make up a significant portion of OTC use, particularly due to frequent exposure to dust, pollen, and other environmental irritants common in agricultural settings. To manage symptoms like coughing, nasal congestion, and allergies, people often turn to antihistamines (such as loratadine and diphenhydramine), decongestants like pseudoephedrine, and cough

suppressants including dextromethorphan. Available in forms like syrups, tablets, and nasal sprays, these treatments are suitable for both adults and children, adding to their convenience (GoodRx, 2023; Cleveland Clinic, 2024). Digestive issues are another common concern, leading to regular use of gastrointestinal OTC products. Poor sanitation, unsafe water, and inconsistent meal patterns contribute to problems like diarrhea, constipation, and acid reflux. To manage these, families often use antidiarrheals (e.g., loperamide), laxatives (such as bisacodyl), and medications like antacids or proton pump inhibitors (including calcium carbonate and omeprazole). These treatments help prevent complications like dehydration and improve daily comfort, supporting overall household health (Drugs.com, 2024; RxList, 2024). Topical treatments are also widely relied upon, given the physical demands and environmental hazards of farm work. Antiseptic creams, antifungal ointments, hydrocortisone, and wound care supplies are routinely used to treat cuts, insect bites, rashes, and minor infections. Additionally, eye and ear drops are commonly applied to address irritation or infection caused by dust, dirt, or chemical exposure, playing an important role in maintaining health under challenging rural conditions (Cleveland Clinic, 2024; MSD Manual, 2025).

**Table 1.** Over-the-Counter (OTC) Medications Commonly Used by Farm Families.

Common Medication Used	*Frequency	Percentage
Analgesics and antipyretics	245	98.0
Anti-malarial formulations	280	92.0
Cough, cold, and respiratory medications	247	98.8
Gastro-intestinal medications	198	79.2
Topical preparations	225	90.0
Vitamins / mineral supplements	236	94.4
Pain relief gels/ointments	248	95.2
Antibiotics	235	94.0
Antihistamines	210	84.0

\*Multiple responses

Table 2 showed that the conditions for which OTC medications and use abound. They range from malaria and febrile conditions (98.8%), body pains and musculoskeletal issues (100.0%), headaches and stress-related discomforts (96.4%), respiratory tract infections and cough (99.2%), gastro-intestinal discomfort (92.8%), Minor injuries/wounds/matchet cuts (95.2%), worm infections/general weakness (80.0%), and skin infections and rashes (78.8%). In rural farming communities, over-the-counter (OTC) medications are commonly used to treat mild, short-term illnesses that do not immediately require medical intervention. These conditions often stem from environmental factors, occupational risks, and the limited availability of healthcare services in remote areas. As a result, self-medication has become a widespread practice, with OTC drugs playing a key role in everyday health management (BMC Public Health, 2023; JCCP, 2025).

Headaches and general body pain are among the most frequently treated conditions. The physical demands of farming such as plowing, planting, and harvesting often lead to muscle strain and joint discomfort. Research shows that headaches are the most common reason for using OTC medicines, followed by back pain and generalized aches. Analgesics and anti-inflammatory drugs are widely chosen due to their fast action and low cost (PMC, 2023; PMC, 2020). Fever is another condition commonly addressed with OTC treatments in these areas. It is frequently linked to infections like malaria, respiratory illnesses, and other febrile diseases prevalent in tropical climates. Many households use antipyretics such as paracetamol to manage fever before deciding whether to consult a healthcare provider. Studies indicate that fever is one of the leading reasons for self-medication, highlighting both its frequency

and the trust people place in readily available remedies (PMC, 2023; BMC Public Health, 2019).

Respiratory symptoms including cough, sore throat, and the common cold are also routinely managed with non-prescription drugs. Exposure to dust, smoke from cooking or burning fields, and fluctuating weather increases the likelihood of such illnesses. Data suggests that a significant number of rural residents turn to OTC options for relief, particularly for cold and cough symptoms. Since these issues are generally seen as minor, individuals often opt for accessible medications instead of visiting clinics (JCCP, 2025; PMC, 2023). Digestive problems like diarrhea, stomach pain, indigestion, and bloating are also widespread

in farming households. Contributing factors include contaminated water, poor sanitation, and irregular meal times. Evidence shows gastrointestinal symptoms rank high among reasons for self-treatment, with antidiarrheals, antacids, and oral rehydration solutions being common choices (PMC, 2020; JCCP, 2025). Skin issues such as rashes, cuts, insect bites, and fungal infections are also prevalent due to frequent contact with soil, crops, and farming equipment. These minor injuries and irritations are typically treated at home using OTC topical products like antiseptics, antifungal creams, and healing ointments. While reported less often than other conditions, skin-related problems remain a notable part of self-care practices in rural populations (PMC, 2023; ResearchGate, 2023).

**Table 2.** Common Conditions for Which OTC Medications Are Used.

Common Illness	*Frequency	Percentage
Malaria and febrile conditions	247	98.8
Body pains and musculoskeletal issues	250	100.0
Headaches and stress-related discomforts	241	96.4
Respiratory tract infections and cough	248	99.2
Gastro-intestinal discomfort	232	92.8
Minor injuries/wounds/matchet cuts	238	95.2
General weakness and worm infections	200	80.0
Skin infections and rashes	197	78.8

\*Multiple responses.

Table 3 showed the reasons farm families rely on over-the-counter medications. These include limited access to clinics or hospitals (84.0%), high cost of medical care (96.4%), immediate relief to maintain farm labor (95.2%), reliance on perceived experience (90.8%), distance/transportation challenges (97.2%), and lack of health education (85.6%), time constraints (94.8%), and perceived urgency of illness (95.6%), and pharmaceutical accessibility (86.6%), Preventive use (96.0%). Rural farming households frequently depend on over-the-counter (OTC) medications, influenced by a mix of structural, economic, and socio-cultural factors that shape how they access healthcare. A primary reason is the scarcity of formal medical services in remote areas, prompting families to turn to self-medication as a practical solution. OTC drugs are readily available through local pharmacies, small retail outlets, and informal sellers, enabling people to address common health issues without seeing a healthcare provider. This ease of access supports independent care and eases pressure on overburdened health systems (Algarni *et al.*, 2021; Hanumantharayappa & Siddaiah, 2016). Cost is another significant factor. Many rural families struggle with limited financial resources and find it difficult to cover expenses such as doctor visits, travel, or lab tests. OTC medicines offer a more affordable alternative, helping households manage illnesses without major financial strain. Research shows that saving money and reducing the need for repeated clinic trips are key reasons people choose self-treatment (Parikh *et al.*, 2016; Tesfamariam *et al.*, 2019).

Convenience and time efficiency also strongly influence OTC use. Farmers often work long hours and may not have the flexibility to travel far for medical care. Since OTC drugs provide fast relief for minor conditions like fever, headaches, or coughs, they allow individuals to continue working with little interruption. Studies confirm that saving time and achieving quick symptom relief are among the most common reasons for using these medications (Tefamariam *et al.*, 2019). Familiarity with illness management and confidence in personal judgment further support the use of OTC drugs. Many rural residents feel capable of diagnosing and treating common ailments based on prior experience or advice shared within their communities. Larger household sizes in rural areas often promote the exchange of health-related knowledge, reinforcing self-medication habits. Cultural acceptance and long-standing familiarity with certain medications also contribute to their continued use without professional oversight (Frontiers in Public Health, 2026; Kaladharan *et al.*, 2023). Lastly, the belief that OTC medicines are safe and appropriate for mild health problems plays a major role in their popularity. Because these drugs are available without a prescription, many view them as low-risk and suitable for initial treatment. They are commonly used for everyday issues like colds, pain, or stomach discomfort conditions perceived as not requiring medical intervention further embedding their use in daily rural life (Algarni *et al.*, 2021; Tesfamariam *et al.*, 2019).

**Table 3.** Reasons for Farm Families' Reliance on Over-the-Counter (OTC) Medications.

Reason for Use	*Frequency	Percentage
Limited access to clinics/hospitals	210	84.0
High cost of medical care	241	96.4
Immediate relief to maintain farm labor	238	95.2
Reliance on past treatment experience	227	90.8
Cultural practices and beliefs	238	95.2
Distance/transportation challenges	243	97.2
Lack of health education	214	85.6
Perceived urgency of illness	239	95.6
Time constraints due to farm engagements	237	94.8
Pharmaceutical accessibility	215	86.0
Preventive use	240	96.0

\*Multiple responses.

Table 4 showed the perceived and actual health effects of OTC medication use. Perceived effects include quick relief of symptoms ( $M = 2.56$ ), reduced farm absenteeism ( $M = 2.61$ ), reduced need for hospital visits ( $M = 2.50$ ), improved physical strength ( $M = 2.70$ ), and increased confidence in self-care ( $M = 2.65$ ). On the other hand, actual health effects, OTC medications lead to incomplete treatment/persistent illness ( $M = 3.01$ ), adverse drug reactions ( $M = 2.94$ ), worsening of underlying conditions ( $M = 2.87$ ), increased risk of drug interactions ( $M = 2.74$ ), Development of antimicrobial resistance ( $M = 2.66$ ), health complications ( $M = 2.59$ ), Reduced functional capacity of farmers ( $M = 2.70$ ), economic costs of adverse health effects ( $M=2.91$ ), and mental health impacts ( $M = 3.04$ ), and dependency/neglect of preventive measures ( $M=2.78$ ). The use of over-the-counter (OTC) medicines has grown more widespread among rural farming households, primarily because of limited access to formal healthcare and the need for fast, low-cost treatment options. This practice significantly influences farm labor supply and agricultural output.

Common OTC drugs such as pain relievers, antimalarials, and antibiotics allow farmers to treat minor illnesses on their own, helping them avoid work interruptions. In rural areas where farming labor typically comes from family members, the health of each individual directly affects the household's ability to carry out essential tasks. As a result, responsible use of OTC medications can support consistent labor availability during critical times like planting, weeding, and harvest, reducing delays in key farming activities (Visiongain, 2023; Gulwako *et al.*, 2023). Yet while OTC drugs can improve short-term work continuity, incorrect usage carries serious risks that may harm productivity in the long run. Self-treatment without proper medical knowledge often leads to misdiagnosis, wrong dosages, and the development of drug resistance, particularly with antibiotics. Research shows that rural farmers who depend on informal advice frequently receive

ineffective care, leading to longer recovery times and reduced physical stamina. This not only lowers work efficiency but can also increase overall healthcare spending, pulling financial resources away from agricultural investments (Gulwako *et al.*, 2023). There is strong evidence linking personal health to farming performance. Healthier farmers are better equipped to handle physically demanding work, adopt new techniques, and achieve higher crop yields. In contrast, poor health diminishes energy and engagement in farm activities, resulting in lower output. Findings from rural Nigeria suggest that better health and nutrition are strongly associated with improved production efficiency and stronger economic outcomes for farming families (Otegunrin *et al.*, 2023). When used correctly, OTC medicines can thus support productivity by maintaining daily functioning and preventing small health issues from becoming severe. Moreover, OTC medication use also affects agricultural performance through livestock management. Many farmers use non-prescription veterinary drugs to treat sick animals due to a lack of access to veterinarians. Appropriate application of these treatments can enhance animal well-being, decrease death rates, and boost productivity in animal-based enterprises. However, improper use may lead to antibiotic resistance, unsafe drug residues in products, and financial losses, all of which can weaken farm profitability and output (Gulwako *et al.*, 2023). Despite its advantages, the heavy dependence on OTC medicines highlights deeper structural problems, such as underdeveloped rural health systems and insufficient agricultural extension support.

These gaps push farmers toward self-care strategies that are not always reliable. Tackling these challenges through better healthcare access, targeted education, and tighter oversight of OTC drug sales could maximize the benefits of medication use for labor stability and farm productivity. Improving rural health infrastructure is therefore crucial for supporting long-term agricultural development and food security (OECD, 2024; Salami *et al.*, 2024).

**Table 4.** Perceived and Actual Health Effects of OTC Medication Use.

Perceived Effect	Mean	SD
Quick relief of symptoms	2.56	0.58
Reduced farm absenteeism	2.61	0.44
Reduced need for hospital visits	2.50	0.54
Improved physical strength and muscle capacity	2.70	0.64
Increased confidence in self-care	2.65	0.70
<b>Actual Effects</b>		
Incomplete treatment or persistent illness	3.01	1.05
Adverse drug reactions or side effects	2.94	0.34
Worsening of underlying conditions	2.87	0.80
Increased risk of drug interactions	2.74	0.63
Development of antimicrobial resistance	2.66	0.94
Long-term health complications	2.59	0.61
Reduced functional capacity	2.70	0.78
Economic cost of adverse health effects	2.91	0.83
Mental health impact	3.04	0.91
Neglect of preventive measures	2.78	0.79

Accepted mean = 2.30

Table 5 showed the influence of good health on farm productivity. OTC use on labor and farm productivity. OTC minimizes absence from work (M = 2.91), sustains physical performance of labour (M = 3.04), and provides immediate response to health challenges (M = 3.10). Delayed recovery due to drug misuse (M = 3.20), adverse side effects reduces capacity (M = 3.15), cumulative health impairment (M = 3.10). OTC medication may affect farm activity planning (M = 2.81), makes farm monitoring difficult (M = 2.96), leads to funds mismanagement (M = 3.04), leads to over-use-of family labour (M = 3.06), and results in general inefficiency (M = 3.07). The use of over-the-counter (OTC) medications has grown among rural farming households as farmers seek to handle minor health issues, pain, fatigue, and work-related injuries without relying on formal medical care. In many rural agricultural settings, limited access to healthcare professionals and financial limitations contribute to widespread self-medication, which carries both benefits and risks for labor supply and farm productivity. While OTC drugs can help farmers stay active by relieving symptoms and allowing them to continue working, improper or excessive use may lead to adverse effects, diminished performance, and chronic health problems that threaten the long-term viability of farm labor (Gulwako *et al.*, 2023).

A key factor is how OTC medication affects labor availability in the short term. In remote farming areas, illness often results in lost workdays or increased dependence on family members to cover duties. Medications like painkillers, antimalarials, and antibiotics may quickly restore a farmer's ability to engage in strenuous tasks, helping maintain daily operations. However, research indicates that treating symptoms

without proper diagnosis can hide serious underlying conditions, leading to recurring health setbacks and greater cumulative work absences (Gulwako *et al.*, 2023). This results in a pattern where short-term gains in labor participation come at the cost of sustained workforce reliability. Regarding agricultural output, OTC drug use influences productivity indirectly by affecting worker performance. Farming success depends heavily on the physical and mental well-being of those working the land, as poor health can weaken endurance, impair judgment, and disrupt consistent management practices. Studies on agricultural labor show that health issues reduce productivity by increasing tiredness, requiring more rest, and creating inefficiencies in daily operations (Asenso-Okyere *et al.*, 2011; Strauss, 1986, cited in Croppenstedt & Müller, 2000). While OTC medicines may boost immediate efficiency by easing discomfort, misuse such as taking incorrect doses or using medications over extended periods without supervision can cause side effects like drowsiness, impaired focus, or dependency, ultimately lowering work quality and overall yields. Another important factor is how over-the-counter (OTC) medications influence decisions about how household labor is allocated. In many small-scale farming households, particularly in developing regions, family members typically provide most of the labor. If a farmer falls ill, OTC medicines can help avoid the need to hire outside workers, cutting costs and keeping farm activities running. Yet if the medication is ineffective or leads to side effects, the household may experience an unexpected drop in available labor. This can lead to reassigning duties among fewer people or postponing essential tasks like planting, weeding, or harvesting. Such disruptions can seriously affect crop output and reduce overall farm earnings (Gabel *et al.*, 2024).

**Table 5.** Influence of OTC Use on Labor Availability and Farm Productivity.

<b>Influence on Labor Availability</b>	<b>Mean</b>	<b>SD</b>
Minimization of work absenteeism	2.94	1.01
Sustained physical performance	3.04	0.84
Immediate response to health problems	3.10	0.91
Delayed recovery due to drug misuse	3.20	0.86
Adverse side effects reduce capacity	3.15	0.70
Cumulative health impairment	3.10	0.94
<b>Influence on Farm Productivity</b>		
Medication may affect planning	2.81	0.88
Makes farm monitoring difficult	2.96	0.76
Delays resource allocation decisions	2.71	0.96
Disrupts farm operations and activities	2.86	0.78
Leads to funds mismanagement	3.04	1.01
Leads to overuse of family labor	3.06	0.87
General negative outcomes	3.07	1.04

Accepted mean = 2.50

**Table 6.** Challenges Associated with OTC Medication Use Among Rural Families.

<b>Challenges of OTC Medication Use</b>	<b>Mean</b>	<b>SD</b>
Lack of proper dosage knowledge	2.64	0.94
Misdiagnosis of illness	2.57	0.46
Risk of drug resistance	2.70	0.59
Drug misuse and overdose	2.61	0.61
Allergic reactions and side effects	2.74	0.74
Financial stress	2.83	0.87
Poor storage and expiry management	2.84	0.83
Limited health education	2.71	0.83
Cultural and social influences	2.80	0.90
Rapid circulation of counterfeit or substandard drugs	2.84	0.76

Accepted mean = 2.50

While OTC medications may provide quick relief from illness, several challenges are associated with their use among rural farmers, their use presents several challenges. According to table 6, these challenges include lack of proper dosage knowledge (M = 2.64), misdiagnosis of illness (M = 2.57), risk of drug resistance (M = 2.70), drug misuse and overdose (M = 2.61), allergic reactions and side effects (M = 2.74), financial stress (M = 2.83), poor storage and expiry management (M = 2.84), limited health education (M = 2.71), cultural and social influences (M = 2.80), and rapid circulation of counterfeit or substandard drugs (M = 2.84). Over-the-counter (OTC) medication use is common among rural farmers, primarily because of limited access to healthcare, high medical expenses, and the need for fast solutions to stay productive. While these drugs can offer quick relief for minor health issues, their use comes with serious drawbacks that can harm both

individual health and agricultural output. These problems stem from factors like insufficient knowledge, incorrect usage, and weak oversight in rural regions. A key concern is the lack of proper understanding and misuse of medications. Many farmers diagnose themselves and choose treatments based on past experiences, often unaware of correct dosages, appropriate uses, or potential side effects. Research indicates that self-treatment frequently results in misdiagnosis, ineffective care, and dangerous drug interactions (Al-Omrani *et al.*, 2023). In rural areas, low health literacy and scarce access to medical advice make this issue worse, raising the risk of improper use and treatment failure.

Another significant problem is the widespread practice of risky self-medication. Data from Nigeria shows that more than 80% of people treat themselves without professional

input, often viewing OTC drugs as completely safe regardless of how they are used (Akande-Sholabi & Akinyemi, 2023; Sanni *et al.*, 2025). This belief promotes overuse or extended use of medications, which can lead to antibiotic resistance, poisoning, or dependency. For farmers, such habits may worsen existing health conditions and impair their ability to work. Harmful side effects from OTC drugs and the failure to report them also present a major challenge. Although these medications are generally safe when used correctly, misuse can cause adverse reactions. Yet, many rural users do not report these effects due to poor awareness or limited connection to health systems. These underreporting hampers efforts to identify drug-related issues and allows ongoing health threats to persist in farming communities (Utami *et al.*, 2024), leaving farmers exposed to harm without realizing it.

Moreover, inadequate healthcare access and weak regulation intensify the risks associated with OTC drug use. In many rural areas, farmers rely on informal vendors or local shops where medicines are sold without proper supervision or counseling. This increases exposure to counterfeit or expired drugs and inappropriate recommendations. Studies in sub-Saharan Africa show that easy drug availability, combined with long waits at clinics and financial barriers, fuels high rates of self-medication (Makeri *et al.*, 2025). Finally, a critical but often overlooked issue is that OTC drugs can hide symptoms of serious illnesses, leading to delayed medical care. The temporary relief provided may discourage farmers from seeking timely professional help, allowing conditions to worsen. This delay can result in more complex health problems, higher treatment costs, longer recovery times, and reduced productivity. Evidence suggests self-medication often masks underlying diseases and postpones accurate diagnosis, creating serious long-term health consequences (Islam, 2024; Al-Omrani *et al.*, 2023).

To improve healthcare delivery and increase farm yields, table 7 recommend the following strategic practice: health education and awareness programs (M = 2.54), improved access to primary healthcare facilities (M = 2.61), promotion of rational OTC medication use (M = 2.70), integration of health and agricultural extension services (M= 2.67), encouragement of preventive healthcare practices (M=2.58), monitoring and regulation of OTC medications (M = 2.81), and encouragement of cooperative farming practices (M = 2.64). Enhancing health conditions and agricultural productivity in rural areas calls for coordinated, long-term approaches that simultaneously support human health and farming efficiency. Rural communities frequently deal with overlapping issues, including inadequate healthcare, malnutrition, limited use of advanced farming methods, and environmental decline. These challenges are closely linked, as the health of farmers directly affects their ability to work effectively, make sound decisions, and sustain agricultural output. As a result, recent development research increasingly supports

integrated solutions that combine health initiatives, technological progress, and environmental stewardship. A central approach involves strengthening local healthcare services and health-related education. Reliable access to basic medical care, clean water, and sanitation improves farmers' physical condition and working capacity. Educational efforts focused on hygiene, balanced diets, and responsible medication use help lower illness rates and boost productivity. Research shows that rural development programs integrating health and education components lead to better health and greater community involvement in economic activities (Yu *et al.*, 2024). Therefore, supporting community health workers, mobile medical units, and public awareness initiatives can positively impact both health standards and farming performance.

Another effective strategy is the uptake of modern agricultural tools and digital technologies. Innovations such as precision farming equipment, high-yield seed varieties, mechanization, and climate-adaptive techniques contribute to higher crop production and reduced physical strain. Findings from Nigeria indicate that digital tools like forecasting systems and online agriculture platforms can enhance yields, minimize risks, and raise farmer incomes (Alih, 2025). These platforms also deliver timely information on weather patterns, pest management, and market trends, helping farmers manage resources more effectively and make informed choices. Farmer training and skill development are also essential for progress in health and agriculture. Programs that teach sustainable cultivation methods, correct use of fertilizers and pesticides, and safe work practices lead to safer and more productive farming systems. Evidence suggests that extension services that build knowledge and technical abilities improve both farm output and household well-being (Cooper, 2025; FundsforNGOs, 2024). Including health education within agricultural training further encourages behaviors that safeguard farmers' health during daily operations. Sound environmental management and sustainable farming practices are equally important. Efforts to maintain soil fertility, manage water resources efficiently, and apply agroecological principles support lasting productivity while reducing health hazards. Studies highlight that preserving soil integrity and ecological balance is vital for resilient food systems and adaptation to environmental pressures (Sintim *et al.*, 2022). Local measures such as turning organic waste into compost or cultivating traditional crops can simultaneously improve dietary quality, lower disease risks, and boost harvests (Olowo *et al.*, 2022). Finally, upgrading rural infrastructure and market access plays a key role. Reliable transportation networks, storage options, and availability of farming supplies and medical services allow farmers to operate more efficiently and stay healthier. Better infrastructure helps reduce crop losses after harvest, increases earnings, and improves access to healthcare, fostering a cycle of improved health and productivity. Integrated development models suggest that combining improvements in infrastructure, health, and agriculture leads to the most durable and impactful results (Yu *et al.*, 2024).

**Table 7.** Strategies for Improving Health Practices and Agricultural Output.

Strategy for Improvement	Mean	SD
Health education and awareness programs	2.54	0.48
Improved access to primary healthcare facilities	2.61	0.55
Promotion of rational OTC medication use	2.70	0.60
integration of health and agricultural Extension services	2.67	0.64
Formation of cooperatives	2.56	0.76
Encouragement of preventive healthcare practices	2.58	0.73
Monitoring and regulation of OTC medications	2.81	0.61
Encourages cooperatives Farming Practices	2.64	0.58
<b>Average mean = 2.50</b>		

The financial impact of over-the-counter (OTC) medication use among rural farming families can be divided into direct and indirect expenses. Direct costs involve spending on buying OTC drugs, frequent self-medication, and extra medical expenses resulting from improper use. Many households in rural areas allocate a considerable share of their income to repeatedly purchasing medications, often due to returning symptoms or treatments that fail to work. Indirect costs stem from reduced productivity caused by illness, lower output in farm labor, and time lost during recovery periods. When farmers suffer side effects like dizziness or tiredness, their ability to work effectively may be compromised, which can ultimately lead to lower crop production and decreased earnings.

The average monthly cost of OTC medication according to the table 8 is approximately ₦8, 930 only. Therefore, 36% of respondents spend between ₦5,000 and ₦9,990 monthly only on OTC medications use. They are followed by 26% who spend between ₦1000 -₦4,999 only on the OTC medications. The highest expenditure comes from our (38%) who spends more than ₦15,000 monthly on OTC medications. The financial impact of over-the-counter (OTC) medicine use in rural households plays a significant role in overall healthcare spending in developing countries. In many rural areas, OTC drugs are seen as a more affordable option compared to formal medical services, largely because of high clinic fees, travel expenses, and poor access to health facilities. While using OTC medications may lower immediate costs, their long-term economic consequences can be considerable when misuse results in health complications or the need for repeated treatments. Therefore, assessing the true cost of OTC drug use requires considering both short-term affordability and potential long-term expenses.

In the near term, OTC medicines seem financially appealing because they avoid the costs of doctor visits and diagnostic tests. Data from Nigeria indicate that high hospital charges and difficulties in paying medical bills strongly influence people's decisions to self-medicate (Sanni *et al.*, 2025), suggesting that OTC use is often a strategy to manage limited resources. The actual cost varies based on how many and what kinds of medications are

used. Research on personal health spending shows that individuals using a single OTC drug typically face moderate expenses, whereas those using several drugs tend to spend much more (Alrasheedy *et al.*, 2026). In Nigerian terms, monthly OTC spending in rural homes generally falls between ₦5,000 and ₦25,000, depending on how often illness occurs and the size of the household.

Yet, despite these apparent savings, relying on OTC medicines can lead to higher overall treatment costs over time due to incorrect self-diagnosis, improper use, and delays in seeking professional care. Evidence from low- and middle-income countries indicates that self-medication is linked to higher rates of illness, antibiotic resistance, and treatment failures conditions that often require more intensive and costly medical care later (Ocan *et al.*, 2023; Asenso-Okyere *et al.*, 2011). For example, infections that are left untreated or poorly managed can worsen, eventually requiring hospitalization and significantly increasing total healthcare costs beyond any initial savings.

Another key aspect is how healthcare spending is distributed within households. In rural regions, medication costs make up the largest portion of out-of-pocket health expenses often accounting for 70–80% of total spending (Babatunde *et al.*, 2019). This means that even when people do access formal care, the price of medicines, including OTC products, remains a major financial strain. For families with low and irregular incomes, regularly buying OTC drugs for common conditions like malaria, headaches, or respiratory infections can gradually accumulate into serious financial pressure. Indirect costs also add to the economic burden. These include lost work time, repeated purchases of ineffective medications, and spending on alternative therapies. When OTC drugs fail to improve health, individuals especially farmers may suffer extended illness, reduced work capacity, and lower agricultural yields. Moreover, the eventual need for professional medical care increases both direct costs, such as treatment fees, and indirect ones like transportation and time away from work. Research suggests these indirect expenses are frequently underestimated but play a substantial role in the overall financial impact on rural households (Rao *et al.*, 2022).

**Table 8.** Estimated Cost of OTC Medication Use (₦).

Cost Range (\$)	Midpoint (X)	Frequency (f)	FX (₦)	Percentage
₦1000 – 4,999	3,000	65	195,000	26.0
₦5,000 – 9,999	7,000	90	675,000	36.0
₦10,000 – 14,999	12,000	60	750,000	24.0
₦15,000 and Above	17,000	35	612,000	14.0
Total		<b>250</b>	<b>2,232,500</b>	<b>100</b>

To estimate the average cost implication, the weighted mean formula was used.

$$\underline{X} = \frac{\sum Fx}{\sum F}$$

Where  $\underline{X}$  = Mean monthly cost of OTC medication use  
 F= Frequency of respondents in each cost category  
 X= Midpoint of each cost category  
 $\sum F$ = Total number of respondent

Thus,

$$\underline{X} = \frac{\sum Fx}{\sum F}$$

$$\underline{X} = \frac{2,232,500}{250} = \text{₦}8,930$$

**CONCLUSION**

Over-the-counter medications are essential for maintaining the health and productivity of rural farming households. They offer quick relief from common illnesses and help ensure that labor remains available for agricultural work. However, improper use can lead to serious long-term health consequences and negatively impact farming efficiency. The coexistence of these benefits and risks highlights the importance of expanding healthcare access, strengthening regulations, and improving health literacy in rural communities. Tackling these issues can help optimize the advantages of OTC medication use while reducing potential harm, supporting both sustainable agriculture and broader rural development.

**ACKNOWLEDGMENT**

The authors express sincere thanks to the Head of the <sup>7</sup>Department of Agricultural Extension, Federal University of Technology, Owerri, Imo State, Nigeria for the facilities provided to carry out this research work.

**CONFLICT OF INTERESTS**

The authors declare no conflict of interest

**ETHICS APPROVAL**

Not applicable

**FUNDING**

This study received no specific funding from public, commercial, or not-for-profit funding agencies.

**AI TOOL DECLARATION**

The authors declares that no AI and related tools are used to write the scientific content of this manuscript.

**DATA AVAILABILITY**

Data will be available on request

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