Environmental Audit and Policy Compliance of Tobacco Farming Practices in Migori County, Western Kenya

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Abstract: There is growing evidence that tobacco farming and use, among other critical livelihood factors, has an impact not only on health but also on the environment. The tobacco industry in Kenya has been on the rise with new production areas emerging. However, the nature of the environmental friendliness of the production, processing and consumption technologies have yet to be evaluated in many parts of Kenya. This study undertook an environmental auditing of tobacco farming activities in the South Nyanza region of Kenya for purposes of evaluating their compliance levels and policy formulation. Data collection was achieved through a detailed environmental audit checklist, focused group discussions, interviews, and field observations. Generally, the environmental compliance level with the National Environment Management Authority, World Health Organization standards and world best farming practices was dismal, at 13.6%. Tobacco companies' compliance rating with standards in application of pesticides and agrochemicals, use and management of energy resources, tobacco leaf storage and disposal of uncollected leaves, occupational health and safety, and best established practices in corporate social responsibility stood at 19.8, 15.7, 27.7, 2.1 and 11.8%, respectively. The low compliance level implies unsustainable farming practices; thus the need for enhanced enforcement of good environmental practices in the sector. Development of policies and legislation on economically viable and environmentally sustainable alternative crops is therefore recommended.

Keywords: tobacco, compliance, regulations, alternative crops.

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Introduction

Despite increased global efforts to reduce world tobacco production and use, weak policy strategies and lack of compliance by many industry players continue to undermine this realization. Some government policies in Kenya seem to indirectly promote tobacco expansion and production. Some of these policies have recognized tobacco as a commercial, high-income earner crop, and this has contributed to its increased production even in high potential areas [1, 2]. The Kenyan Government policy on poverty alleviation encourages crop diversification as a long-term solution, and tobacco is one of the crops classed as an alternative to Kenya’s major crops [3]. This reality has led to a rapid expansion of tobacco farming, with more farmers investing more resources in the industry. The expansion is further attributed to the collapse or market challenges facing other cash crops like cotton, sisal, and pyrethrum [4]. Tobacco production has increased...
tremendously since its introduction to Kenya over 50 years ago. Today, it is grown by about 20,000 small scale farmers on over 15,000 hectares of land [5]. The annual tobacco production in 2017 was estimated at 16,000 tons [1]. When cash crops are preferred, large tracks of land are cleared, and traditional crops like cassava, millet and sweet potatoes, which have always been important safeguards during periods of drought and famine, become scarce [5–7]. Consequently, poverty, lowered livelihoods, increased social ills like child labor, and the prevalence of acquired immunodeficiency syndrome (AIDS/HIV) have become widely reported [8, 9].

The environmental impacts of tobacco production are multi-dimensional, affecting diverse sectors of human life, from increased environmental pollution, poverty, food insecurity, and gender and health related impacts [11]. There have been corresponding effects like perpetual famine in the tobacco growing zones leading to malnutrition and hunger, especially among women and children [1]. Child labor and school drop-outs are a common feature in these zones. In addition, the drying of tobacco leaves, also referred as curing, uses significant amounts of biomass and wood from indigenous flora, leading to deforestation and massive land degradation. Again, in the majority of setups, the design of the curing plants or barns expose farmers to tobacco smoke - potentially exposing them to tobacco-related diseases. Moreover, livestock production has also been significantly reduced, as most of grazing lands have either been converted to tobacco farms or degraded [2].

Unfortunately, these unsustainable environmental practices have continued to dominate the entire tobacco production value chain. Some tobacco companies (TCs) openly flout environmental safeguards due to the massive political and economic influences they wield [1, 5]. Some of these companies are so influential that sometimes even local authorities and government agencies are powerless in their sight. As Hu & Lee confirm: “Most African governments promote tobacco farming as a way to alleviate poverty”, but “the economic benefit of tobacco farming has been used by the tobacco industry to block tobacco control policies” [11]. The outcome of the 16th World Conference on Tobacco or Health (WCTOH) acknowledged the harmful nature of “all tobacco products” as the leading cause of disease and death worldwide, with a special burden on low and middle-income countries [12]. The same convention acknowledged the serious impacts that tobacco growing has on the natural resource base in the affected regions. Some of these impacts include deforestation, air pollution, and soil erosion [12].

A number of national and international regulations exist for fostering compliance and environmental sustainability in the tobacco industry and for general environmental management [13]. Article 12 of the WHO Framework Convention on Tobacco Control (FCTC guidelines) emphasizes public awareness, access to information regarding adverse health effects, and economic and environmental consequences of tobacco production and consumption. Article 18 of the same framework emphasizes the protection of the environment and the health of people involved in tobacco cultivation and manufacture within their respective territories [2]. Emphasis on quality and standards is also articulated in the standards of the International Organization for Standardization (ISO) [14].

At the national level, environmental governance and regulations emanate from various national acts of parliament or sector based policies which are largely implemented by specific national institutions and agencies mandated to manage and coordinate environmental services [15]. Some of the key policy frameworks of influence in Kenya include the Environmental Management and Coordination Act (EMCA 1999 revised in 2013) [16], the environmental impact assessment and audit regulations (2003) [17], and the Occupational Safety and Health Act of Kenya (OSHA) [18]. Other sector-based acts of parliament and policies governing safe use of resources include the water act, water quality regulations, agriculture act, the forest conservation and management act, forest policy, and Kenya’s development blueprint-the vision 2030 [19–26]. The current study was conceived with the aim of environmentally auditing tobacco growing practices to establish their compliance with national and international policies and regulations.
Methods

Research area
This study was undertaken in four administrative sub-counties within the newly constituted lake-region counties of Migori and Homa-Bay in South Nyanza, Western Kenya. The particular sub-counties included Ngege in Migori, Ekerege in Kuria, Sindo in Suba, and Rangwe in Homa-Bay County.

Data collection
The methodology considered the Kenya national environment management authority, environmental impact assessment/audit regulations of 2003, and environmental standards captured from various local and international environmental regulations and policies, as presented in Table 1.

Focused group discussions (FGDs) were used to engage the farmers. A stratified random sampling procedure was used to select 15 farmers from two major tobacco companies operating in the area. A comprehensive environmental audit checklist was presented against the compliance levels shown in Table 2.

Data analysis
Environmental compliance scores for each item were calculated. The key assessment standards were assessed on the basis of tobacco farming practices and guidelines contained in the Crop Production and Livestock Act of Kenya 1977 (revised 2012) [25, 26]. Table 3 presents the maximum possible scores for each item highlighted. Each item had different parameters analyzed; i.e., compliance to soil and water conservation was assessed on the basis of 10 different parameters that relate to good soil and water conservation practices. The maximum scores were calculated by multiplying the parameter quantity and the maximum possible score of 3 (well compliant) -see Table 2.

Results

Application of pesticides
Compliance to the standards on the application of pesticides and agrochemicals was assessed for each of the tobacco companies. The findings revealed low compliance levels in the use, application and handling

| Table 1. National and international environmental regulations relevant to tobacco farming and the sustainable development goals (SDGs) |
|-------------------------------------------------------------|
| Regulations | Sections |
| Environmental Management and Coordination Act (EMCA) (1999, revised 2013) | second schedule, section 7 of EMCA |
| Environmental impact assessment and audit regulations (2003) | Part V, sections 31 and 32 |
| The Crop Production and Livestock Act (tobacco growing and marketing) rules | chapter 321, part I-IV, pp 69–76 |
| The agriculture and food authority act 2014 | section 184 |
| Tobacco control act | Section IV & V |
| WHO FCTC guidelines | article 12 part |
| Occupational safety and health act (OSHA) (2007) | part II, section 11 |
| (Part IX sections 83–90 and Part XI section 101) |
| EMCA waste management regulations, 2006 | part V, sections 24 and 25 |
| water quality regulations, 2006 | part II, section 4, subsections 1 & 2 |
| Wildlife conservation and management act, 2013 | section 12 |
| Forest conservation and management act 2016 | sections IV- policy statement 1.1.1 |
| Water act 2012 | section ii |
| Pest control product act | section ii |
| Kenya vision 2030 | section 4.5 |
| ISO 26000 on corporate social responsibility | ISO 26000:2010 |
| ISO 14001: 2004 on environmental management systems | part 4.4.5 of ISO 14001: 2004 |
| FCTC: Framework convention on tobacco control |

| Table 2. Compliance score matrix showing various evaluation categories, scores and percent rating of each. |
|-------------------------------------------------------------|
| Compliance description | Score | Compliance rating (%) |
| Nothing in place | 0 | 1 - 25 | poor implementation |
| Un satisfactory | 1 | 26 - 50 | fair implementation |
| Satisfactory | 2 | 51 - 75 | good implementation |
| Well compliant | 3 | 76 - 100 | implemented |
of pesticides and agrochemicals by tobacco farmers. The companies scored a combined average of 19.8% (Table 4), which indicates poor performance in the handling of pesticides and agrochemicals. The individual compliance levels for Alliance One Ltd/BAT and Mastermind (K) Ltd were 18.6 and 19.8%, respectively. The tobacco companies also reported poor scores on standards relating to pesticide and agrochemical storage, where a cumulative score of 15.3% was recorded, with individual scores being 15.3 and 15.4% for Alliance One Ltd/BAT and Mastermind (K) Ltd, respectively. Poor performance was also registered in the disposal of expired pesticides, agrochemicals and empty containers; a dismal compliance of 11.1% was reported by the two companies investigated. This low performance indicates weak commitment on the side of the companies to compliance with the established standards in this area.

Analysis of farming practices and compliance to the water act 2012, water quality regulations 2006, and waste management regulations 2006 revealed low compliance levels with regards to the types and characteristics of pesticides used. Alliance One Ltd/BAT for example, scored 33.3% while Mastermind (K) Ltd scored 0.0%. The average score for both companies stood at 16.7%. Apart from keeping records of pesticides used and their characteristics, the tobacco companies are also expected to continually monitor the effects of their chemical use on water quality in their areas of jurisdiction. However, the results reveal very dismal performances (11.1%) for both companies. The companies rarely monitored the quality of water or rivers impacted by their activities.

Tobacco curing and use of energy resources/fuel wood

This section assessed the companies’ levels of compliance with established guidelines and standards on the use and management of energy resources. Eighteen parameters were assessed with regards to standards on cutting of trees for curing tobacco (deforestation). Low performance was recorded, indicating indiscriminate cutting of trees by tobacco farmers. The average score for the companies was 16.7% (Table 5), and individual scores were 22.2% and 9.3% for Alliance One Ltd/BAT and Mastermind (K) Ltd, respectively.

The performance on soil and water resources conser-
vation standards (Table 5) was found to be completely lacking (0.0%): both companies surveyed scored 0.0%. High level of soil erosion was reported, leading to monumental sedimentation and subsequent eutrophication of the surrounding water bodies. Again, the companies performed fairly low (average score of 26.7%) with regards to standards relating to characteristics of species selected for reforestation. The scores for individual companies were 33.3 and 20.0% for Alliance One Ltd/BAT and Mastermind (K) Ltd, respectively. The performance of the two companies on forestation programs was likewise low, with an average score of 25.0%. The individual scores for the companies were 26.7 and 23.3% for Alliance One Ltd/BAT and Mastermind (K) Ltd, respectively.

Tobacco leaf storage and disposal of uncollected leaves
This section had eight assessment standards, each with a maximum score of 3 points and a total maximum score of 24 points. Tobacco farmers registered low compliance levels: the compliance score for both Alliance One Ltd/BAT and Mastermind (K) Ltd contracted farmers was 25.0 and 29.2%, respectively, with an average of 27.0% (Table 6).

Occupational health and safety
Compliance with occupational health and safety standards was assessed, and the average level of compliance stood low, at 2.1%, for both companies. The individual compliance levels for Alliance One Ltd/BAT and Mastermind (K) were 0.0% and 4.1%, respectively. Neither company has an occupational safety and health (OSH) policy nor a health, safety and environment system in place to guide their operations and ensure the safety of tobacco farmers. An interactive discussion with the tobacco farmers revealed that the only concern of the companies was how they could get high grade tobacco. Hence, both companies showed indifference towards occupational safety and health issues.

Corporate social responsibility
The tobacco companies performed poorly on compliance ratings with best established practices on corporate social responsibility (CSR). The overall score for the companies was 11.6% (Table 7), indicating poor adoption of good practices in CSR. Mastermind

### Table 4. Levels of compliance in application of pesticides and agrochemicals

| Standard                                                                 | Alliance One Ltd/BAT (%) | Mastermind (K) Ltd (%) | Average (%) |
|------------------------------------------------------------------------|--------------------------|------------------------|-------------|
| Pesticides and agrochemicals application and handling                  | 18.6                     | 20.8                   | 19.8        |
| Pesticides and agrochemicals storage                                   | 15.3                     | 15.4                   | 15.3        |
| Disposal of expired pesticides, agrochemicals and empty containers     | 22.2                     | 0.0                    | 11.1        |
| Characteristics of pesticides used                                     | 33.3                     | 0.0                    | 16.7        |
| Effects of pesticide and agrochemical use on water quality             | 11.1                     | 11.1                   | 11.1        |
| Average                                                                | 20.2                     | 9.5                    | 14.8        |

### Table 5. Tobacco companies’ levels of compliance on leaf curing and use of forest resources

| Standard                                                                 | Alliance One Ltd/BAT (%) | Mastermind (K) Ltd (%) | Average (%) |
|------------------------------------------------------------------------|--------------------------|------------------------|-------------|
| Cutting of trees for curing tobacco                                    | 22.2                     | 9.3                    | 15.7        |
| Effects of deforestation on water and soil resources                   | 0.0                      | 0.0                    | 0.0         |
| Characteristics of species selected for reforestation                  | 33.3                     | 20.0                   | 26.7        |
| Effects of reforestation                                               | 26.7                     | 23.3                   | 25.0        |
| Average                                                                | 20.6                     | 13.2                   | 16.9        |

### Table 6. Assessment of Compliance on leaf storage and disposal and occupational health and safety

| Target                                                                 | Alliance One Ltd/BAT (%) | Mastermind (K) Ltd (%) | Average (%) |
|------------------------------------------------------------------------|--------------------------|------------------------|-------------|
| Tobacco leaf storage and disposal of uncollected leaves                | 25.0                     | 29.2                   | 27.0        |
| Occupational health and safety                                         | 0.0                      | 4.1                    | 2.1         |
(K) Ltd performed poorly, with a score of 6.0%, while Alliance One Ltd/BAT scored 17.3%. CSR was analyzed in 2 major areas, i.e., community involvement and environmental dimensions.

The study also assessed CSR by investigating the tobacco companies’ community involvement in development, for instance education and culture, technology development and access, wealth and income generation, community health, and social investment. Best practices, comprised of 46 standards with a maximum score of 138 points overall, was used to assess compliance level. The best CSR practice was community involvement, which recorded an average compliance level of 21.3%, Mastermind (K) Ltd and Alliance One Ltd/BAT recording 15.2% and 27.3% compliance, respectively.

Overall, the tobacco companies’ compliance level with CSR standards was a dismal 11.6%. Alliance One Ltd/BAT and Mastermind (K) registered compliance levels in CSR of 17.3 and 6.0 %, respectively.

**Discussion**

**Pesticide and chemical use**

Indiscriminate chemical pesticides and other agrochemical uses in agriculture directly pose environmental and public health concerns to human beings, wild animals and the ecosystem in general. Some agrochemicals, when present in the soil or water interface, may be potentially toxic to terrestrial and aquatic organisms. Chemicals may also persist in the environment, depending on the ease of biodegradation and mobility, while some chemicals may alter the quality of water and soil thus making it unfit for good productive use and habitation [27, 28]. Subsequently, environmental guidelines and standards have been provided as an opportunity for safe and wise management of environmental practices [14, 16, 29]. Sustainability of the environment is therefore dependent on the level of compliance on the available operational standards for various sectors and industries.

In our study, the findings presented revealed critical weaknesses in meeting several standards as invested under this research. First, compliance with guidelines on the handling, storage and disposal of these agrochemicals was poor (compliance < 20%). Minimal use of personal protective equipment was reported; deaths and miscarriages were also reported in some extreme cases. The occupational health and safety act sections 83–90 and Section 101, as well as pest control product act section II gives guidance on the use and storage of pesticides, which in this case were greatly undermined, leading to the threats already mentioned. Again, as indicated in Table 5, the storage of pesticides and agrochemicals in the same house was widely reported, and even cases of suicide were reported from such chemical use. These chemical containers are dangerous; the liquid types have a potential of leaching into soil and contaminating soil and water resources, thus putting the lives of children and aquatic organisms, for instance, in danger.

### Table 7. Tobacco companies’ levels of compliance with corporate social responsibility regulations and standards

| Parameter                  | Standard                              | Alliance One Ltd/BAT (%) | Mastermind (K) Ltd (%) | Average (%) |
|----------------------------|---------------------------------------|--------------------------|------------------------|-------------|
| **Environmental dimensions** | Prevention of pollution               | 12.1                     | 9.1                    | 10.6        |
|                            | Sustainable resource use              | 16.7                     | 0.0                    | 8.4         |
|                            | Regulation of climate change          | 6.6                      | 0.0                    | 3.3         |
|                            | Climate change adaptation             | 11.1                     | 0.0                    | 5.6         |
| **Community involvement and development** | Community involvement        | 27.3                     | 15.2                   | 21.3        |
|                            | Education and culture                 | 22.2                     | 11.1                   | 16.7        |
|                            | Technology development and access     | 38.7                     | 0.0                    | 19.4        |
|                            | Wealth and income generation          | 33.3                     | 8.8                    | 21.1        |
|                            | Community health                      | 0.0                      | 8.3                    | 4.2         |
|                            | Social investment                     | 4.7                      | 7.1                    | 5.9         |
| **Average**                |                                       | 17.3                     | 6.0                    | 11.6        |
Compliance to disposal and reuse of empty chemical containers was similarly low in relevance to the water act, water quality regulations, waste management regulations [30], and section II of the pest control product act. Some of the practices identified could potentially predispose the water sources to pollution. Some of these practices included location of tobacco crop nurseries in riparian zones, mixing pesticide chemicals next to rivers, rinsing pesticide chemical containers directly in the river, open-river bathing after working in the tobacco farms, and washing clothes laden with pesticide chemicals in the river, among others. These practices are undermining the provisions of waste management regulations, Water quality regulations, and the water act. According to the World Health Organization (WHO), unintentional poisoning kills an estimated 355,000 people globally each year [28] through excessive exposure to and inappropriate use of toxic chemicals. Such damaging effects of agrochemicals have been widely documented [31–33], and particular concerns and recommendations are given for tobacco based industrial players [34].

Tobacco curing and resource use

The average score for tobacco curing and resource use/firewood was 15.7% (Table 5) for the two companies. The low compliance level could be attributed to the fact that farmers grow mostly fire-cured tobacco, which requires large supplies of wood fuel for curing. This has led to harmful practices such as indiscriminate cutting of indigenous trees, cutting of endangered tree species and degradation of fragile ecosystems such as river banks, water catchment and protected areas, etc. Also found to be an issue was the fact that a significant majority of the tree species selected for reforestation programs, e.g. *eucalyptus species*, are highly water and nutrient dependent, leading to depletion of water and nutrients in the already nutrient-stressed soils. The resultant consequences are decreased soil health and low crop productivity, exposing residents to poverty and overdependence.

Soil and water conservation/afforestation programs

Several factors are responsible for the low compliance with soil and water conservation standards (average 0.0%, Table 5) resulting in high levels of soil erosion which potentially increase sedimentation and eutrophication. During rainy seasons, farmers are forced to move to high areas to avoid being affected by floods. Low afforestation programs may also be cited as another cause of the low compliance; despite the small efforts noted by the companies to embrace the use of indigenous trees in their reforestation programs, the efforts far less match the high rates of deforestation. Another problem is the widespread emphasis on nutrient-depleting eucalyptus tree plants as a choice in reforestation. Certain tree species used by farmers were suspected to be invasive species, e.g. *Lantana camara*, and their continued use could threaten other species [33] or lead to decline in soil fertility and water supply. These practices accelerate biodiversity losses and decline, and in essence violate the Forest and Agriculture Acts.

Tobacco leaf storage and disposal of uncollected leaves

Tobacco leaf storage and disposal of uncollected tobacco leaves is a major challenge for tobacco farmers in the whole region. The level of compliance by both Alliance One Ltd/BAT and Mastermind (K) Ltd contracted farmers is 25 and 29.2%, respectively, with an average level of compliance of 27.0%. Such results could be attributed to many factors, including the fact that farmers do not have designated stores for tobacco leaf storage. In some cases, residential houses were used for storage of cured tobacco leaves, since farmers can not afford to construct secure tobacco stores. Similarly, due to the high value of tobacco leaves, farmers prefer storing them within their residential houses, thereby protecting from possible theft. It was reported that theft of tobacco leaves is rampant, and farmers are sometimes forced to store them in their houses. This happens despite the possible respiratory problems that might accrue from the smoke or smell. The likely indoor air pollution might also expose the community, especially children, to respiratory health problems. Interestingly, the Kenyan law has a vacuum when it comes to the legal and policy framework on storage of harvested tobacco leaves. The environmental management and co-ordination (waste management) regulations 2006, as a supreme law governing waste management in Kenya, has gaps in the guidelines on management and disposal of agricultural wastes. In most cases, uncollected tobacco leaves are disposed, scattered and left to decompose on the farms. There is a possibility of these
leaves being washed from the tobacco farms and surrounding areas by surface run off into the river, leading to both surface and ground water pollution. In the same regulations, part 11 section 4 on prevention of water pollution highlights the need for every person to refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution.

**Occupational health and safety**

The level of compliance on Occupational Safety and Health stood low, at 2.1%. There was an apparent lack of compliance on occupational safety and health standards, and farmers were found to be highly exposed to a myriad of occupational health risks. None of the two tobacco companies studied had an occupational safety and health (OSH) policy. Neither had any health, safety and environment system in place to guide their operations and ensure safety of tobacco farmers. Similarly, they failed to recognize and respect farmers’ rights to obtain timely, full and accurate information concerning health and safety risks. A closer interaction with the tobacco farmers revealed that the companies are just obsessed with how to get high grade tobacco - a probable explanation of the glaring indifference towards occupational safety and the health of the farmers and workers. In a related observation, the companies neither recorded nor investigated health and safety accidents, they took little care of affected employees, and were reported as being reluctant to granting freedom to seek medical attention. The lack of clear safety and health protocols may lower workers’ morale and sense of belonging, lead to low productivity, and result in unnecessary loss of lives [18]. Part XI section 7 (1) (a) of the occupational safety and health act 2007 highlights the duty of the employer to prepare and implement a safety and health policy statement, which is lacking among the companies. Again, part XI section 101 (1) of the occupational safety and health act 2007 requires that every employer provides and maintains suitable protective clothing and appliances, including suitable gloves, footwear, goggles and head coverings. The WHO recognizes the need for continuous monitoring of environmental quality and the carrying out of site-specific continuous assessments of changes to environmental quality [3].

**Corporate social responsibility**

According to ISO 26000:2010 part 6.8.9 [14] on community involvement and development issue number 7, social investment takes place when organizations invest their resources in initiatives and programs aimed at improving social aspects of community life. Organizations and companies are expected to pay attention to the vulnerable, discriminated, marginalized and the under-represented groups among others, encouraging the enrolment of children in formal education or contributing to the elimination of barriers to child education. Companies can spur local development by promoting and engaging in community development and social investment projects, including water, sports, and relief programs, among others, but the tobacco companies only scored 14.7%, a score bordering on insensitivity to the plight of the communities supporting them. In most cases, even accident prevention programs were not well entrenched. There was also no evidence of measuring, recording and reporting the sources of direct and indirect accumulated green house gas emissions as required by corporate social responsibility.

Also for effective CSRs, companies need to consider their contribution to the development of low cost renewable energy technology. During the period of research, farmers still had to travel over 50km deep into the Maasai Mara national reserve -a renowned global wildlife reserve due to the wildebeest migration wonder- to collect firewood for tobacco curing. These practices may negatively impact endemic species if they are not avoided. Interestingly, the study found that nearly all tobacco processing factories are located in Nairobi, far from where production occurs, thus denying the regions where they operate the much needed economic empowerment [1].

**Conclusions and Recommendations**

The following conclusions can be advanced. The low compliance levels imply unsustainable farming practices in the regions affected. Some of the effects include environmental degradation, impacts on aquatic life and health status of the farmers, soil erosion attributed to deforestation and loss of indigenous tree species due to high demands of wood fuel for curing.
purposes. The introduction of alternative crops like bamboo, soya beans, and horticultural crops is therefore a justified means of conserving the environment.

Some of the recommendations proposed include developing appropriate legislation for full implementation of article 18 of World Health Organization framework convention on tobacco control by the government of Kenya. This is because the existing tobacco control act is deficient as it has no provisions for regulating tobacco crop production, farming activities and enforcement. The act does not deal with regulation of tobacco farming activities thereby creating a serious policy gap that needs to be filled up.

Moreover, the development of policies and legislation on economically viable alternative crops to tobacco is critical. A future scientific and clinical study on the health status of tobacco farmers for occupational health and safety policy making purposes is also recommended.

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Conflict of interest

The authors have declared that no conflict of interests exists.

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西ケニアのミゴリ郡におけるたばこ生産の環境監査と政策コンプライアンス

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要 論：重要な生計手段としてのたばこの生産と利用は健康だけでなく、環境にも影響を与えるという証拠が増えている。ネニアでは、たばこ産業が拡大しており、新たな生産地域が出現している。しかしながら、生産、加工、そして処理技術の環境への負荷の性質は、ネニアの多くの地域で未だ評価されていない。本研究では、遵守レベルの評価と政策立案を目的として、ネニアの南ニャンザ地域におけるたばこ農業活動の環境監査を実施した。データ収集は、詳細な環境監査チェックリスト、フォーカスグループ討議、インタビューおよび現地観察を通じて行った。国家環境管理局、世界保健機関（WHO）の基準、および世界的に適正農業生産実践規範に対する環境コンプライアンスレベルは、13.6%と概して悲観的だった。殺虫剤や農薬の使用、エネルギー資源の使用と管理、たばこの葉の保管と未回収の葉の廃棄、労働安全衛生、そして企業の社会的責任における確立された最善慣行に対するたばこ会社のコンプライアンス評価は、それぞれ19.8、15.7、27.7、2.1、11.8%であった。低い遵守レベルは、持続不可能な農業を意味し、それゆえこの地区で環境に良い活動の実施強化が求められる。経済的に実行可能で環境的に持続可能な代替作物の開発と政策立案と法制化が推奨される。

キーワード：たばこ、コンプライアンス、規制、代替作物。

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