

Research Article

Health Behaviors and Diet Quality Among Adults in Southern Togo: A Cross-sectional Study

Dandonougbo Novignon^{1, 2, *} , Souho Tiatou² , Dandonougbo Koffi² ,
Sossou Kodjovi³ , Mensah Labité Komlan⁴ , Dandonougbo Tossavi² ,
Tabago Dissirama² , Aglago Elom Kouassivi⁵ , Melila Mamatchi⁶ 

¹Department of Food and Biotechnology, South Ural State University, Chelyabinsk, Russian Federation

²Department of Life and Earth Sciences, University of Kara, Kara, Togo

³Department of Biotechnology and Bioinformatics, Biological Institute, Tomsk State University, Tomsk, Russian Federation

⁴Department of Pharmacy, University of Lomé, Lomé, Togo

⁵Department of Epidemiology and Biostatistics, Imperial College London, London, United Kingdom

⁶Department of Biochemistry, University of Lomé, Lomé, Togo

Abstract

Objective: To assess the association between selected health behaviors, particularly physical activity, alcohol consumption, and smoking, and dietary quality among adults living in southern Togo. **Methods:** A cross-sectional study was conducted from September 12 to November 30, 2025, among 1,181 adults, including 990 urban and 191 rural residents. Data were collected using a digital questionnaire administered via the KoboToolbox platform. Diet quality was assessed using a composite score based on the consumption of ten food groups. The score ranged from 3 to 9, with a mean of 7.54 ± 1.12 and a median of 8. Participants were classified as having high diet quality (score ≥ 8) or low diet quality (score < 8). Associations between health behaviors and diet quality were examined using bivariate analyses, Pearson correlations, and multiple linear regression adjusted for key sociodemographic characteristics. **Results:** A weak but positive association was observed between alcohol consumption and diet quality ($r = 0.119$; 95% CI: 0.063-0.175; $p < 0.001$). This association remained significant after adjustment in the multivariate model ($\beta = 0.314$; $p < 0.001$). In contrast, no statistically significant association was found between physical activity and diet quality ($r = -0.033$; $p = 0.256$), or between tobacco use and diet quality ($r = -0.005$; $p = 0.853$). **Conclusion:** Among the adults studied in southern Togo, alcohol consumption was weakly associated with better diet quality, whereas physical activity and tobacco use were not significantly associated with the diet quality score. These findings suggest that the health behaviors considered are not necessarily interdependent in this population, and that diet quality may be influenced by other sociodemographic, economic, and cultural determinants. However, the cross-sectional design does not allow for causal inference.

Keywords

Diet Quality, Health Behaviors, Physical Activity, Alcohol Consumption, Tobacco Use, Adults, Togo

*Correspondence: Dandonougbo Novignon (dandonovignon@gmail.com)

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1. Introduction

Noncommunicable diseases (NCDs) currently represent a major public health challenge in West Africa, driven in particular by rapid changes in lifestyles and dietary habits [1]. In Togo, as in several countries of the region, the nutrition transition is accompanied by increasing availability of processed foods and a progressive transformation of traditional dietary practices [2]. At the same time, behaviors such as physical activity, tobacco use, and alcohol consumption may influence the risk of chronic disease by acting on metabolic status, inflammation, and overall nutritional balance [3, 4].

Diet plays a central role in disease prevention, particularly when it is diverse and rich in fruits and vegetables [5]. However, diet quality does not depend solely on food availability: it is also shaped by sociodemographic factors, cultural preferences, and individual behaviors [6]. Physical activity may thus be accompanied by healthier dietary habits, either because it is part of an overall health-oriented lifestyle or because of shared determinants such as education level or income [7]. Conversely, tobacco and alcohol consumption may coexist with a less balanced diet, owing to direct effects on food preferences as well as mechanisms related to social context and daily routines [8, 9].

Despite the importance of these relationships, local data simultaneously documenting several health behaviors and their relationship with diet quality remain limited in southern Togo. A better understanding of these associations nonetheless appears necessary to effectively guide prevention and health promotion strategies [10].

This cross-sectional study therefore aims to evaluate the correlations between health behaviors and dietary habits in southern Togo, examining more specifically the association between physical activity, tobacco use, and alcohol consumption on the one hand, and diet quality on the other, while accounting for the main sociodemographic factors likely to confound these relationships.

2. Materials and Methods

2.1. Study Design and Setting

This was a descriptive cross-sectional study conducted in southern Togo from September 12 to November 30, 2025. Data were collected using a digital questionnaire administered on the KoboToolbox platform (Harvard Humanitarian Initiative), an open-source tool dedicated to electronic data collection. Southern Togo is characterized by high population density, a wide diversity of food markets, and marked socioeconomic heterogeneity. The study mainly covered the urban and peri-urban areas of Greater Lomé the capital and its surroundings, as well as several localities in the Maritime and Plateaux administrative regions.

2.2. Participants and Recruitment

Participants were adults aged 18 years and older, residing exclusively in southern Togo. Residents of both urban and rural areas were included to allow comparisons of dietary habits and lifestyles according to place of residence. Recruitment was carried out through a field survey targeting community groups and communication networks active in the study area. In total, 1,181 adults were included, comprising 990 urban and 191 rural residents.

2.3. Data Collection Tool and Variables

The questionnaire included several modules covering the following dimensions: sociodemographic characteristics (age, sex, education level, occupation, monthly income, marital status, and health insurance coverage); dietary habits (consumption of staple foods, functional foods, animal-source products, tubers, fruits and leafy vegetables, and processed foods, as well as vegetarian dietary practices); and lifestyle-related behaviors, namely physical activity, tobacco use, and alcohol consumption. This choice of variables is based on international recommendations for studying the determinants of non-communicable diseases in the African context [11, 12], and reflects the main domains of the World Health Organization's STEPS questionnaire, adapted to local realities [13].

2.4. Assessment of Diet Quality

Diet quality was estimated using a composite score built from the presence or absence of consumption of ten food groups derived from the questionnaire. This dietary diversity score (DDS) approach is widely validated as a simple and reliable indicator of overall nutritional quality, particularly in low-resource settings [14]. The score ranged from 3 to 9 points (mean 7.54 ± 1.12 ; median 8). Based on the distribution of scores in the sample, participants were divided into two groups: "high" diet quality for a score greater than or equal to the median (≥ 8), and "low" diet quality for a score below 8. This median-based cutoff is common practice in nutritional epidemiology for distinguishing dietary profiles when no predefined clinical threshold exists [15].

2.5. Statistical Analysis

Descriptive statistics were calculated for all study variables. Continuous variables are presented as mean $\pm$ standard deviation and were compared using Student's t-test; categorical variables are expressed as counts (n) and percentages (%) and were compared using the Chi-square test, in accordance with epidemiological standards [16]. As the main objective was to examine the association between health behaviors and diet quality, bivariate analyses were conducted between diet quality (high versus low) and the selected lifestyle indicators (physical activity, alcohol consumption, and tobacco use).

Pearson correlation coefficients (r), together with their 95% confidence intervals, were then calculated to quantify the strength of these associations, complemented by multiple linear regression adjusted for the main sociodemographic factors. Multivariate adjustment is essential to control for potential confounders such as age, sex, and socioeconomic status, whose influence on health behaviors is well documented [6]. All tests were two-tailed, with a significance threshold set at $p < 0.05$. Analyses were performed using R software, the use of which is now widespread in biomedical research owing to its flexibility and robustness [17].

3. Results

3.1. Sociodemographic Characteristics of the Study Population

A total of 1,181 adults were included in the analysis, comprising 990 residing in urban areas and 191 in rural areas. Mean age differed significantly between the two groups (31.9 ± 8.7 years in urban areas versus 35.2 ± 9.8 years in rural areas; $p < 0.001$), while sex distribution was comparable between the two settings ($p = 0.149$).

Table 1. Sociodemographic characteristics of participants by place of residence.

Characteristic	Urban (N = 990)	Rural (N = 191)	p
Age (years), mean $\pm$ SD	31.9 ± 8.7	35.2 ± 9.8	<0.001
Female sex, n (%)	327 (33.0)	74 (38.7)	0.149
Male sex, n (%)	663 (67.0)	117 (61.3)	0.149
Married, n (%)	389 (39.3)	132 (69.1)	<0.001
Single, n (%)	601 (60.7)	59 (30.9)	<0.001
Higher education, n (%)	911 (92.0)	161 (84.3)	0.003
Monthly income > 200,000 FCFA, n (%)	391 (39.5)	54 (28.3)	0.010
Moderate/easy access to healthcare, n (%)	854 (86.3)	149 (78.0)	0.003
Health insurance, n (%)	550 (55.6)	100 (52.4)	0.463

Marital status varied significantly according to place of residence, with a higher proportion of married participants in rural areas (69.1%) than in urban areas (39.3%; $p < 0.001$). Education level also differed: the proportion of participants with higher education was greater in urban areas (92.0%) than in rural areas (84.3%; $p = 0.003$). Monthly income was also significantly associated with place of residence ($p = 0.010$), as was access to healthcare ($p = 0.003$), whereas health insurance coverage did not differ significantly between the two groups ($p = 0.463$).

3.2. Dietary Habits by Place of Residence

Dietary habits differed for several food groups according to place of residence. Fish and seafood consumption was reported by nearly all urban participants (97%) and by all rural participants (100%; $p = 0.029$). Egg consumption was more frequent in urban areas than in rural areas (67.5% versus

55.5%; $p = 0.002$).

No significant difference was observed for the consumption of staple foods (98.8% versus 100%; $p = 0.256$), vegetables and leafy greens (85.8% versus 86.9%; $p = 0.759$), tubers (71.7% versus 70.7%; $p = 0.839$), or fats, oils, and butter (77.3% versus 74.9%; $p = 0.530$). Consumption of so-called “functional” foods showed only a borderline significant difference (97.5% in urban areas versus 100% in rural areas; $p = 0.052$).

Regarding animal-source products, white meat consumption (chicken, turkey) was more frequent in rural areas than in urban areas (88.5% versus 78.8%; $p = 0.003$), whereas red meat consumption was higher in urban areas (70.9%) than in rural areas (63.4%; $p = 0.046$). A vegetarian-type diet was reported more often in urban areas (10.7%) than in rural areas (5.8%; $p = 0.050$), and processed food consumption also differed by setting (96.8% in urban areas versus 100% in rural areas; $p = 0.023$).

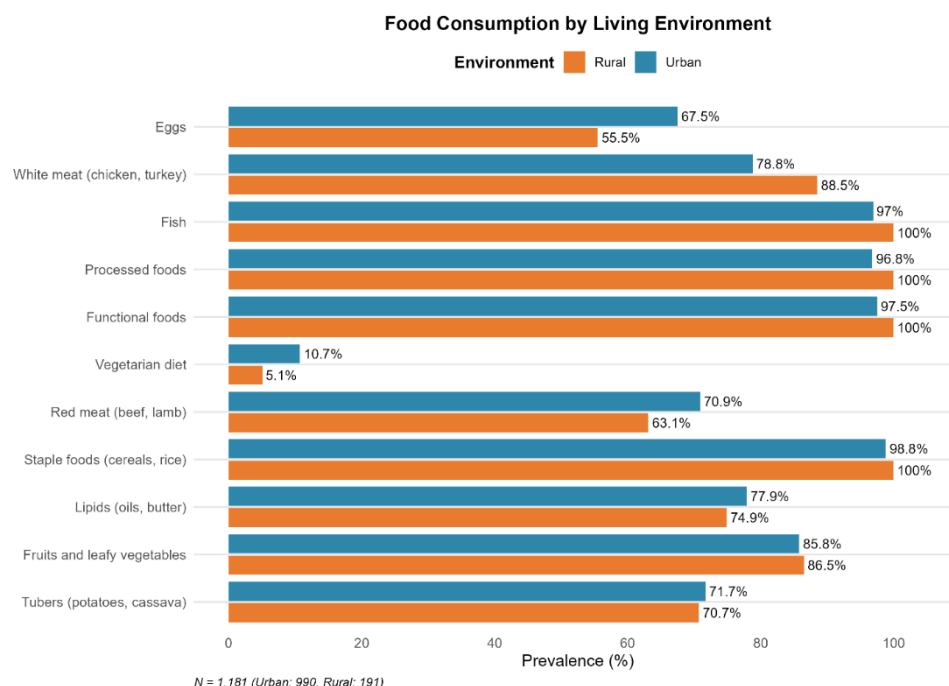


Figure 1. Comparison of food consumption between urban ($n = 990$) and rural ($n = 191$) residents in southern Togo. Bars represent the percentage of participants reporting consumption of each food group (Chi-square test; * $p < 0.05$, ** $p < 0.01$).

3.3. Physical Activity, Alcohol Consumption, and Tobacco Use by Setting

Lifestyle-related behaviors also varied significantly by place of residence. Physical activity differed markedly between the two groups ($p < 0.001$): urban participants more often reported never engaging in physical activity (15.9%) or engaging in it occasionally (54.6%), whereas rural participants more frequently reported regular practice (50.3% versus 29.5% in urban areas).

Alcohol consumption also differed significantly between the two settings ($p < 0.001$). A higher proportion of rural participants reported occasional alcohol consumption (89.0% versus 74.3% in urban areas), whereas regular consumption was reported only in urban areas (7.2%), with no regular consumers identified in rural areas.

Tobacco use, however, did not differ significantly between the two settings ($p = 1.000$): the large majority of participants reported never having smoked (98.0% in urban areas versus 97.9% in rural areas), with a small proportion reporting occasional tobacco use (2.0% versus 2.1%). No regular smokers were identified in either group.

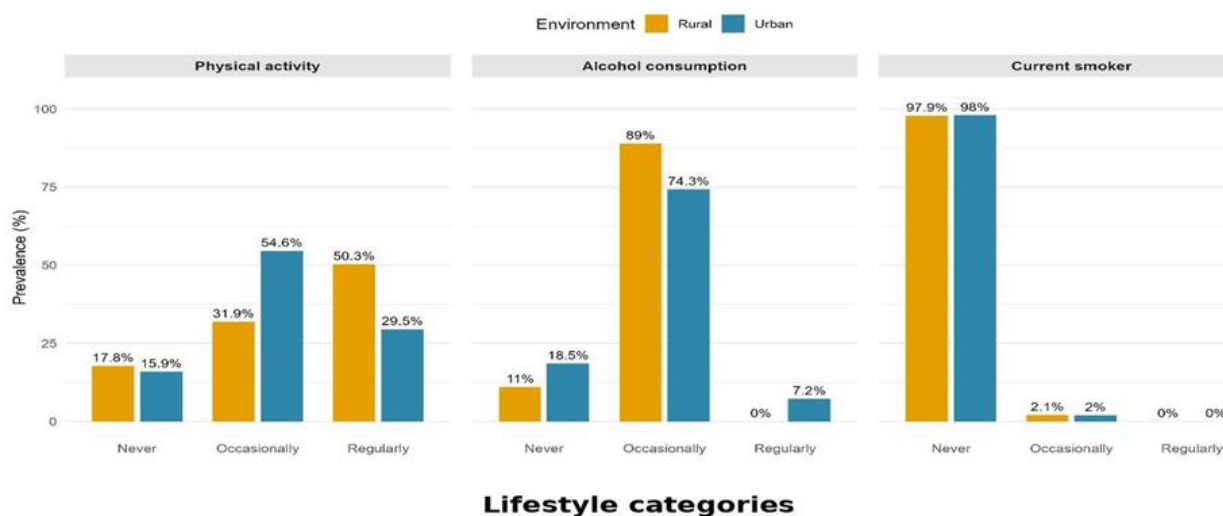


Figure 2. Lifestyle characteristics of participants by place of residence ($N = 1,181$).

3.4. Distribution of Health Behaviors in the Overall Sample

Across the entire sample, regular physical activity was reported by 32.9% of participants, occasional activity by 51.0%,

and complete inactivity by 16.2%. Regarding alcohol, 76.7% of participants consumed it occasionally, 6.0% regularly, and 17.3% never consumed it. Tobacco use remained marginal: 98.0% of participants had never smoked, 2.0% smoked occasionally, and no regular smokers were recorded.

Table 2. Distribution of health behaviors in the sample ($N = 1,181$).

Behavior	Level	N	Percentage (%)
Physical activity	Never	191	16.2
	Occasional	602	51.0
	Regular	388	32.9
Alcohol consumption	Never	204	17.3
	Occasional	906	76.7
	Regular	71	6.0
Tobacco use	Never	1,157	98.0
	Occasional	24	2.0
	Regular	0	0.0

3.5. Correlations Between Health Behaviors and Diet Quality

Pearson correlation analysis showed no significant association between diet quality and physical activity ($r = -0.033$;

95% CI $[-0.090; 0.024]$; $p = 0.256$), nor between diet quality and tobacco use ($r = -0.005$; 95% CI $[-0.062; 0.052]$; $p = 0.853$). In contrast, a weak but statistically significant positive correlation was observed between alcohol consumption and diet quality ($r = 0.119$; 95% CI $[0.063; 0.175]$; $p < 0.001$).

Table 3. Pearson correlations between health behaviors and the diet quality score.

Variable	r	95% CI	p	Significant
Physical activity	-0.033	$[-0.090; 0.024]$	0.256	No
Alcohol	0.119	$[0.063; 0.175]$	<0.001	Yes
Tobacco	-0.005	$[-0.062; 0.052]$	0.853	No

CI = Confidence Interval.

These same associations were explored categorically, by comparing the proportions of participants with high diet quality according to the level of each behavior. No significant difference was observed across physical activity levels ($p = 0.4113$): the proportion of participants with high diet quality was comparable among those reporting no physical activity (56.5%), occasional activity (51.5%), or regular activity (54.4%). Similarly, tobacco use was not associated with diet

quality ($p = 1.0000$), with 53.2% high diet quality among non-smokers versus 54.2% among occasional smokers. Alcohol consumption, however, was significantly associated with diet quality ($p = 0.0073$): participants who never consumed alcohol had the lowest proportion of high diet quality (43.6%), compared with 55.6% among occasional consumers and 50.7% among regular consumers.

Table 4. Association between health behaviors and diet quality (categorized score).

Variable	Category	Low quality, n (%)	High quality, n (%)	p
Physical activity	Never	83 (43.5)	108 (56.5)	0.4113
	Occasional	292 (48.5)	310 (51.5)	
	Regular	177 (45.6)	211 (54.4)	
Alcohol consumption	Never	115 (56.4)	89 (43.6)	0.0073
	Occasional	402 (44.4)	504 (55.6)	
	Regular	35 (49.3)	36 (50.7)	
Tobacco use	Never	541 (46.8)	616 (53.2)	1.0000
	Occasional	11 (45.8)	13 (54.2)	

Note: p-values shown correspond to the overall Chi-square test for each variable; no regular smokers were identified in the sample.

3.6. Multivariate Analysis

To account for potential confounders, multiple linear regression was performed, adjusting for the main sociodemographic characteristics. After adjustment, alcohol consumption remained significantly and positively associated with diet

quality ($\beta = 0.314$; standard error = 0.072; $p < 0.001$), confirming the result observed in the bivariate analysis. Physical activity ($\beta = -0.043$; $p = 0.369$) and tobacco use ($\beta = -0.405$; $p = 0.086$) did not reach statistical significance, although the negative trend associated with tobacco use warrants mention given the limited statistical power resulting from its rarity in the sample.

Table 5. Results of the multiple linear regression adjusted for sociodemographic factors.

Variable	β	Standard error	p
Physical activity	-0.043	0.048	0.369
Alcohol	0.314	0.072	<0.001
Tobacco	-0.405	0.236	0.086

4. Discussion

This cross-sectional study of 1,181 adults in southern Togo provides original insight into the relationships between health behaviors and diet quality in a West African context undergoing nutrition transition. The main finding — a positive and significant association between alcohol consumption and better diet quality — warrants being placed in perspective with data available in the subregion and beyond.

The positive association between alcohol consumption and diet quality ($r = 0.119$; $p < 0.001$; $\beta = 0.314$ after adjustment) partially aligns with studies conducted in West Africa. A study conducted in Cotonou (Benin) by Sodjinou et al. (2008) observed, within an overall lifestyle index combining diet, physical activity, tobacco use, and alcohol, a positive correlation between the alcohol consumption score and the diet quality

score, particularly among women [18]. These findings are consistent with a body of West African evidence suggesting that, in certain cultural contexts, moderate alcohol consumption is socially integrated and correlated with more diverse festive dietary practices [19].

Internationally, this relationship has been documented in very different contexts. Studies have shown that moderate alcohol consumers, particularly wine drinkers, tend to adopt diets of better nutritional quality [20, 21]. However, other work, such as that of Breslow et al., in the United States, did not find this association after adjusting for socioeconomic status, suggesting that income and education could be major confounding factors [8].

In our study, the persistence of the association after adjustment for sociodemographic variables reinforces the robustness of the finding, but the weakness of the correlation coefficient calls for cautious interpretation. This relationship likely

reflects shared socio-behavioral profiles (sociability, urban lifestyle, income level) rather than a direct effect of alcohol on food choices.

Numerous international studies have shown a positive association between physical activity and healthy eating [22, 23]. Our work did not find a significant association ($r = -0.033$; $p = 0.256$). This finding may be explained by the nature of the physical activity measured. In rural areas, physical activity is mainly related to agricultural work and travel rather than voluntary sports practice associated with nutritional awareness; yet it is precisely in rural areas that regular practice was most frequent (50.3% versus 29.5% in urban areas), without translating into better diet quality in this subgroup. In urban areas, conversely, occasional or absent physical activity coexists with often more diverse diets, which may dilute the association.

This decoupling is also reflected in our categorical analyses: the proportion of participants with high diet quality remained comparable regardless of reported physical activity level (56.5% among inactive participants, 51.5% among occasional practitioners, and 54.4% among regular practitioners; $p = 0.4113$). This finding suggests that, in the context studied, diet quality is more strongly influenced by structural determinants such as socioeconomic status, purchasing power, and food availability and accessibility than by physical activity level considered in isolation. This observation is consistent with the World Health Organization's conceptual framework on the social determinants of health and with the work of the Lancet Commission on the syndemic of obesity, undernutrition, and climate change, which emphasize the predominant role of the food environment and socioeconomic conditions in shaping nutritional behaviors [24-26].

The absence of an association between tobacco use and diet quality ($r = -0.005$; $p = 0.853$) should be interpreted with caution. The very low prevalence of tobacco use in our sample (2.0% occasional smokers, no regular smokers) is comparable to the low rates generally reported in public health surveys in West Africa, particularly among women [27]. This low prevalence considerably reduces statistical power to detect a potential association, especially as tobacco use is associated with unfavorable dietary habits in studies conducted in settings with much higher prevalence: in the United States, current smokers report lower fruit and vegetable consumption and higher alcohol consumption than non-smokers [28]; in Europe, smoking intensity is inversely associated with overall diet quality, even after adjustment for socioeconomic status [29].

The negative trend observed in the adjusted model ($\beta = -0.405$; $p = 0.086$) may suggest a detrimental effect of tobacco on diet quality, but this remains non-significant. Studies with a larger number of smokers would be needed to resolve this question.

The disparities observed between urban and rural settings — regarding meat, egg, and processed food consumption and vegetarian practices — are consistent with the regional literature. In Benin, Sodjinou et al. (2009) had already described,

among urban adults in Cotonou, the emergence of a “transitional” dietary profile richer in fats, sugary products, and cholesterol, at the expense of traditional habits, particularly among individuals of higher socioeconomic status or born in the city [30]. More broadly, the West African literature describes an increase in meat, processed food, and fat consumption in urban areas, while rural areas remain more anchored in local cereals and leafy vegetables [19].

These differences, combined with marked gaps in education level, income, and access to healthcare, suggest that place of residence acts as a structuring determinant of dietary behaviors, potentially more influential than health behaviors considered in isolation. This finding argues for public health interventions differentiated by setting, integrating the specific constraints and resources of each context.

5. Conclusion

Our observational study conducted in southern Togo shows that, among the three health behaviors studied, only alcohol consumption was significantly associated with diet quality, with a positive but modest correlation confirmed after adjustment for sociodemographic factors. Physical activity and tobacco use, meanwhile, showed no statistically significant association with diet quality in this population.

These findings suggest that health behaviors considered in isolation explain only a limited share of diet quality, and that diet quality is likely embedded in broader socioeconomic and contextual determinants, particularly those related to place of residence. They underscore the value of an integrated approach, combining multiple levers, in designing health promotion and nutritional prevention interventions in Togo. Further longitudinal studies, including a more detailed quantitative assessment of dietary intake, would help clarify the nature and timing of these associations.

Abbreviations

FCFA	Franc CFA (West African Currency)
SD	Standard Deviation
DDS	Dietary Diversity Score
CI	Confidence Interval

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Author Contributions

Dandonougbo Novignon: Conceptualization, Data curation, Formal Analysis, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing

Souho Tiatou: Conceptualization, Methodology, Validation, Writing – review & editing

Dandonougbo Koffi: Data curation, Investigation, Resources, Writing – review & editing

Sossou Kodjovi: Formal Analysis, Methodology, Validation, Writing – review & editing

Mensah Labité Komlan: Investigation, Resources, Writing – review & editing

Dandonougbo Tossavi: Data curation, Investigation, Writing – review & editing

Tabago Dissirama: Investigation, Resources, Writing – review & editing

Aglago Elom Kouassivi: Methodology, Validation, Writing – review & editing

Melila Mamatchi: Conceptualization, Project administration, Supervision, Writing – review & editing

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

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