

ARTICLE

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population health, bauchi metropolis.**Corresponding author:**Jamil Hassan Abdulkareem
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read and approved the final version of the manuscript, and
agreed to be accountable for all aspects of the work.**Conflict of interest:**

the author(s) declare no potential conflict of interest.

Ethics approval and consent to participate:In this review article, all cited data adhere to ethical
standards**Patient consent for publication:**

not applicable.

Funding:

none.

Availability of data and materials:data and materials are available
from the corresponding author upon request.

Received: 8 May 2026

Accepted: 9 June 2026

ASSESSMENT OF THE POSITIVE IMPACT OF PETROLEUM SUBSIDY REMOVAL ON POPULATION HEALTH: A BAUCHI METROPOLIS PERSPECTIVE, BAUCHI STATE, NIGERIA

ABSTRACT

The 2023 removal of the petroleum subsidy in Nigeria represents a major economic and policy shift with significant implications for population health and wellbeing. This study examines the positive health outcomes associated with subsidy removal in Bauchi Metropolis, Bauchi State, with a focus on physical activity patterns, air quality, transportation behaviors, and household health practices.

A mixed-methods approach was employed, integrating structured questionnaires, key informant interviews, field observations, and secondary data from the Federal Road Safety Corps, academic journals, newspapers, and GIS mapping to track mobility changes.

Descriptive statistical analyses were conducted to explore associations between subsidy removal and selected health indicators. Findings reveal that higher transportation costs have prompted increased walking and cycling among students, workers, and low-income residents, contributing to enhanced physical activity levels and potential reductions in chronic disease risk factors.

Decreased fuel consumption and lower vehicular traffic were also associated with modest improvements in local air quality. Moreover, some households adopted healthier energy and expenditure practices, including reduced reliance on fossil fuels and greater emphasis on preventive health measures. Nonetheless, challenges persist, particularly financial strain and limited access to efficient public transport.

The study concludes that while petroleum subsidy removal may be economically disruptive, it can generate meaningful public health benefits if complemented by targeted interventions such as investments in safe mobility infrastructure and social protection programs.

These findings offer evidence-based guidance for policymakers aiming to align economic reforms with health equity in urban Nigeria.

RIASSUNTO

L'abolizione dei sussidi al petrolio in Nigeria nel 2023 rappresenta un importante cambiamento economico e politico con significative implicazioni per la salute e il benessere della popolazione.

Questo studio esamina gli esiti positivi sulla salute associati all'abolizione dei sussidi nell'area metropolitana di Bauchi, nello Stato di Bauchi, concentrandosi sui modelli di attività fisica, sulla qualità dell'aria, sui comportamenti relativi ai trasporti e sulle pratiche sanitarie domestiche.

È stato utilizzato un approccio a metodi misti, integrando questionari strutturati, interviste a informatori chiave, osservazioni sul campo e dati secondari provenienti dal Corpo Federale per la Sicurezza Stradale, riviste accademiche, quotidiani e mappatura GIS per monitorare i cambiamenti nella mobilità. Sono state condotte analisi statistiche descrittive per esplorare le associazioni tra l'abolizione dei sussidi e alcuni indicatori di salute.

I risultati rivelano che l'aumento dei costi di trasporto ha incentivato un maggiore utilizzo di mezzi di trasporto come la camminata e la bicicletta tra studenti, lavoratori e residenti a basso reddito, contribuendo a migliorare i livelli di attività fisica e

a una potenziale riduzione dei fattori di rischio per le malattie croniche. La diminuzione del consumo di carburante e del traffico veicolare è stata inoltre associata a modesti miglioramenti nella qualità dell'aria locale.

Inoltre, alcune famiglie hanno adottato pratiche energetiche e di spesa più sane, tra cui una minore dipendenza dai combustibili fossili e una maggiore attenzione alle misure di prevenzione sanitaria. Ciononostante, persistono delle difficoltà, in particolare le difficoltà economiche e l'accesso limitato a un trasporto pubblico efficiente.

Lo studio conclude che, sebbene l'eliminazione dei sussidi petroliferi possa essere economicamente destabilizzante, può generare significativi benefici per la salute pubblica se integrata da interventi mirati, come investimenti in infrastrutture per una mobilità sicura e programmi di protezione sociale.

Questi risultati offrono una guida basata su dati concreti per i responsabili politici che mirano ad allineare le riforme economiche con l'equità sanitaria nelle aree urbane della Nigeria.

INTRODUCTION

According to the Nigerian Economic Summit Group, a fuel subsidy refers to direct or indirect financial support provided by the government to individuals or businesses. Direct subsidies take the form of cash transfers from the government to recipients, while indirect subsidies allow industries or households to benefit from government policies such as tax exemptions that lower their economic burden. Subsidies are typically introduced to stimulate production and consumption. For example, when the government offers direct payments to rice farmers, it reduces their production costs and encourages increased rice output an illustration of agricultural subsidization ⁽¹⁾.

The World Bank and the International Energy Agency (IEA) further describe subsidies as any government policy designed to reduce the price of a good or service for consumers below what it would have been without such intervention ⁽²⁾.

Originally, subsidy programs were established to shield consumers by keeping commodity prices affordable, although they come with considerable fiscal implications ⁽³⁾.

Over the years, several sectors in Nigeria including petroleum, education, electricity, healthcare, and the foreign exchange market have received subsidies in various forms ⁽⁴⁾. Despite global commitments to reducing carbon emissions, many governments still support fossil fuel use through policies intended to assist producers and households.

Although these measures are not explicitly framed as fossil fuel subsidies, they ultimately function as such, contributing to rising carbon dioxide emissions. In 2020, the total value of these implicit and explicit subsidies was estimated at 6.8% of global GDP ⁽⁵⁾.

Upon assuming office, President Bola Ahmed Tinubu declared fuel subsidies unsustainable and announced their removal in Nigeria. Globally, fossil fuel subsidies reached \$7 trillion (7.1% of global GDP) in 2022, reflecting a \$2 trillion increase compared to 2020. These subsidies are projected to rise further to \$8.2 trillion by 2030 driven by growing fuel consumption in emerging economies, along with underpricing due to missing consumption taxes, environmental undercharges, and supply cost gaps ⁽⁶⁾.

The announcement of fuel subsidy removal elicited diverse reactions nationwide. While some Nigerians endorsed the policy, others expressed reservations about its timing and potential socioeconomic effects. The decision came at a period when the country was already experiencing pronounced impacts of greenhouse gas emissions from industrial activities and vehicular traffic. Consequently, many environmental management scholars regarded the policy as a strategically positive step toward mitigating environmental degradation ⁽⁷⁾.

Petroleum products have historically underpinned Nigeria's transport and energy systems, with subsidies implemented to ease the financial burden on consumers. However, such subsidies have also contributed to multiple health, safety, and environmental externalities. In Bauchi Metropolis, the previously elevated transport costs under the subsidy regime prompted many residents to walk considerable distances to their workplaces, inadvertently encouraging physical activity with potential health benefits. In contrast, a substantial proportion of the population relies on informal transport modes, particularly okadas, which heighten exposure to vehicular emissions, elevate accident risks, and aggravate traffic congestion.

Health outcomes are shaped by an interplay of social, economic, and environmental determinants. Living conditions, environmental quality, income, education, genetic predispositions, and social networks exert substantial influence on population health, often exceeding the impact of healthcare access alone ⁽⁸⁾.

Transport systems especially road traffic—are major contributors to air pollution and rank among the leading causes of premature mortality and morbidity globally. Systematic reviews consistently identify associations between chronic exposure to traffic-related air pollution (TRAP) and adverse health outcomes ⁽⁹⁾⁽¹⁰⁾.

Additionally, transportation contributes indirectly to health burdens through noise pollution, psychosocial stress, temperature fluctuations, and reduced social connectedness ⁽¹¹⁾.

Conversely, transport infrastructures also shape opportunities for physical activity, influencing the balance between sedentary and active lifestyles.

Routine walking has been widely documented to enhance health across populations.

Evidence from observational and interventional research demonstrates that physical activity, including moderate-intensity walking, reduces the risk and severity of cardiovascular and cerebrovascular diseases, type 2 diabetes, cognitive decline, and dementia, while also improving mental health, sleep quality, and longevity. These benefits are underpinned by improvements in circulatory, cardiopulmonary, and immune function, with established dose–response relationships for walking intensity and duration ⁽¹²⁾.

Furthermore, the removal of fuel subsidies may present opportunities for strengthened health financing and improved social determinants of health ⁽¹³⁾.

Reduced subsidy-driven fossil fuel consumption can lessen environmental pollution, indirectly enhancing population health outcomes ⁽¹⁴⁾.

Savings accrued from subsidy withdrawal can also be redirected toward health sector investment or critical infrastructure development ⁽³²⁾.

Transportation thus remains a critical social determinant of health, serving either as an enabler or barrier to effective health management and health-seeking behaviors ⁽¹⁵⁾.

METHODOLOGY

The source of data collection the study utilized are primary and secondary.

Primary data were generated through field surveys, direct observations, and interviews with residents of Bauchi Metropolis. Secondary data were obtained from peer-reviewed journals, reputable institutional websites, and authoritative publications relevant to the subject matter. Key documents from the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) were also consulted.

The study further monitored trends in vehicular movement, household generator use, and associated greenhouse gas (GHG) emissions within the metropolis.

Secondary sources included Nigerian newspaper reports, scholarly articles, and publications from International Monetary Fund (IMF), World Bank (WB), Intergovernmental Panel on Climate Change (IPCC), International Institute for Sustainable

Development (IISD), and International Energy Agency (IEA), among others. A literature screening process was undertaken, and only documents that met the inclusion criteria were reviewed.

Inclusion criteria comprised studies and reports published from 2020 onward, focusing specifically on fuel subsidy removal, greenhouse gas emissions, and climate change-related challenges in Nigeria.

Publications that did not directly address these themes were excluded. All eligible documents were critically examined, with particular emphasis on issues surrounding fuel subsidy removal in Nigeria. The study was conducted between May and October 2025.

RESULTS AND DISCUSSION

Population health is influenced by environmental factors, social, and economic determinants.

This study synthesizes existing literature to identify factors through which the removal of petroleum subsidy in Nigeria may positively influence public health.

TRANSPORT AND AIR QUALITY

Premium Times (2023), citing the NMDPRA, reported that Nigeria's daily petrol consumption significantly declined following the removal of fuel subsidy. Consumption dropped from 66.9 million litres per day under the subsidy regime to 48.4 million litres per day post-removal ⁽¹⁶⁾ ⁽¹⁷⁾.

This reduction suggests a substantial decline in fossil fuel use, which may consequently lower GHG emissions from automobiles and generators, thereby supporting environmental sustainability and mitigating the impacts of climate change ⁽¹⁶⁾.

There is strong international scientific consensus emphasis that is relationship between air pollution and it adverse health outcomes ⁽¹⁸⁾ ⁽¹⁹⁾.

For instance, the Global Burden of Disease study attributed 4.72 million deaths in 2021 to ambient fine particulate matter (PM2.5) exposure ⁽²⁰⁾. Fuel prices constitute a significant portion of operational expenditures for both commercial and public transport systems.

The elimination of fuel subsidies often results in higher transportation and freight costs, which are typically transferred to end-users ⁽²¹⁾.

As a response to rising fuel prices, many Nigerians have adopted more environmentally friendly modes of transportation, including cycling, walking, and the use of electric bicycles. Some private vehicle owners have also shifted to public transport systems to reduce personal expenses.

These behavioural changes contribute to reduced fossil fuel consumption and lower emissions, thereby improving urban air quality. Integrated urban planning and sustainable transport systems have been shown to reduce environmental burdens and promote healthier cities ^{(11) (22) (33)}.

Findings from the field survey conducted in Bauchi Metropolis align with these trends. Approximately 15% of civil servants who previously drove to work reported switching to alternatives such as electric bicycles, motorcycles, bicycles, and walking. The study further observed a reduction in traffic volume in several congestion-prone areas of the metropolis. These changes collectively contributed to reduced air pollution within Bauchi Metropolis, with broader implications for mitigating global warming and climate change.

ROAD TRAFFIC ACCIDENT TRENDS IN BAUCHI METROPOLIS BEFORE AND AFTER FUEL SUBSIDY REMOVAL (2021–2024)

Road traffic accident statistics for Bauchi State between 2021 and 2024 reveal a fluctuating pattern in both crash occurrence and associated fatalities. In 2021, the Federal Road Safety Corps (FRSC) documented 413 deaths resulting from 480 reported crashes, a figure that received significant coverage in national media ⁽²⁴⁾.

In 2022, FRSC reports indicated a substantial decline in road traffic crashes, estimated at approximately 53% compared to the previous year, as highlighted during the state's 2022 ember-months road safety campaign ⁽²⁵⁾. However, the trend shifted in 2023. Between January and September 2023, the FRSC Bauchi Command recorded 214 crashes, which resulted in 204 fatalities and 679 injuries representing a notably high burden within a nine-month period ⁽²⁶⁾.

TABLE 1
STATISTIC OF ROAD TRAFFIC ACCIDENT IN BAUCHI STATE FROM BEFORE AND AFTER FUEL SUBSIDY REMOVAL (SOURCE FRSC)

2021	Deaths ≈ 193 (reported for 2021 on major routes in Bauchi State)
2022	Partial (to Oct 2022): 93 deaths (Punch reported 93 to date in 2022); FRSC/Bauchi reported a ~53% reduction in crashes in 2022 vs 2021 (state report).
2023	Jan–Sep 2023: 214 crashes → 204 killed, 679 injured (Bauchi State FRSC report for Jan–Sep 2023). Other press reports for 2023 (Jan–Nov) give slightly different partial totals (coverage differences).
2024	Full-year (state) 2024 (as reported by FRSC / local press): 283 crashes, 152 killed, 1,402 injured. (reported in FRSC statement and carried by local papers).

By 2024, data reported by local press citing FRSC sources documented 283 crashes, leading to 152 deaths and 1,402 injuries for the full year ⁽²⁷⁾.

Overall, the temporal pattern shows:

- 2021: exceptionally high fatality and crash counts;
- 2022: a marked reduction in crashes and associated deaths;
- 2023: a resurgence in crashes and fatalities, despite data covering only nine months;
- 2024: persistently high levels of road traffic injuries and deaths.

This pattern is viewed in relation to the timing of Nigeria's official removal of the petrol subsidy in mid-2023. The post-subsidy period characterized by steep fuel price increases coincides with the observed rise in road traffic crashes and fatalities during the latter part of 2023 and throughout 2024 ⁽²⁶⁾.

The period following Nigeria's fuel-subsidy removal in mid-2023 presents several plausible behavioral and systemic pathways such as shifts in transport modes, reduced vehicle maintenance, increased driver workload, and greater pedestrian exposure through which the policy change may indirectly influence road-traffic accident patterns. However, a causal link cannot be firmly established.

Numerous confounding variables, including seasonal variations, differences in enforcement intensity, changes in reporting systems, and broader socioeconomic pressures, limit definitive attribution. Additionally, the absence of disaggregated, metropolis-level data for Bauchi City constrains

any clear conclusion regarding the direct impact of subsidy withdrawal on road-traffic accidents within the metropolis.

INFLUENCE OF PETROLEUM SUBSIDY REMOVAL ON HEALTH, SAFETY, AND ENERGY CHOICES IN BAUCHI METROPOLIS

Increased Transport Costs and Mobility Adjustments:

Following the removal of Nigeria's fuel subsidy, fuel prices rose sharply, resulting in significant increases in transportation costs.

As public transport options such as buses and taxis became more expensive, many residents reduced reliance on motorized transport. Instead, a substantial proportion adopted coping strategies such as walking longer distances or switching to cheaper, less frequent transport modes. This aligns with national survey reports indicating similar behavioral adjustments across the country ⁽²⁸⁾.

Potential Health Benefits Through Increased Physical Activity:

Evidence from field observations and survey data indicates that the subsidy removal of 29 May 2023 led to a marked increase in walking among residents of Bauchi Metropolis. Students across primary, secondary, and tertiary institutions, as well as workers in both public and private sectors, frequently reported walking to their workplaces and schools. The survey conducted for this study showed that 35% of respondents walk at least three times per week, while others reported walking two to four times weekly. These findings corroborate similar reports published by Nairametrics and The Punch in 2023.

From a public health perspective, increased walking can generate substantial health benefits.

Greater engagement in moderate-intensity trekking is known to reduce the risk of chronic disease conditions such as hypertension and diabetes. Regular daily walking particularly for commuting purposes can enhance cardiovascular health, improve metabolic function, strengthen the cardiopulmonary system, and support immune function.

Public-health evidence suggests that meeting recommended activity levels (e.g., walking for at least 30 minutes in day three to four times a week

significantly reduces the risk of age-related diseases and contributes to healthy aging. Low-intensity activities such as walking also exhibit anti-aging properties and provide long-term protective health effects ⁽¹²⁾.

In addition to behavioral health benefits, broader health-system implications are noted in the literature, which suggests that subsidy removal may create fiscal space for increased health funding and improvements in the social determinants of health ⁽¹³⁾.

Similarly, reduced fuel consumption may contribute to lower environmental emissions, yielding indirect health benefits ⁽¹⁴⁾.

According to this study's findings, approximately 20% of participants particularly individuals living with chronic health conditions—reported perceivable improvements in their health status since adopting more frequent walking as a transportation strategy. These results align well with existing epidemiological and public-health evidence on the benefits of increased physical activity.

PERCEPTIONS OF THE POPULATION AND ENERGY CHOICES

The removal of the petroleum subsidy has significantly reshaped Nigeria's energy landscape, accelerating the adoption of renewable energy technologies and increasing interest in electric mobility within urban centres. Findings from the field survey conducted in Bauchi Metropolis indicate that approximately 18% of respondents have transitioned to solar energy for powering their homes and businesses, while a growing number have begun using electric bicycles for intra-city transportation.

These observations are consistent with evidence from related studies. As fuel prices continue to escalate nationwide and particularly in Bauchi Metropolis the financial burden of operating petrol-powered generators has become unsustainable for many households and enterprises.

This economic pressure has enhanced the appeal and uptake of renewable energy sources, especially solar technologies. Analysts argue that subsidy removal promotes more efficient resource utilization and incentivizes greater investment in renewable energy systems ⁽²⁹⁾.

Commentary from the energy sector suggests that the policy shift is likely to accelerate the deployment of solar technologies, mini-grids, and other off-grid solutions, as renewables energy become increasingly cost-competitive compared to fossil-fuel-based energy generation ⁽²⁹⁾.

Current trends support the emerging “solar transition” in Nigeria, where developers are progressively installing solar and battery storage systems, particularly in underserved or off-grid areas. [30] For Bauchi Metropolis, this transition may translate into expanded household, commercial, and institutional investment in solar or hybrid power systems to mitigate rising generator costs. In the long term, such a shift could enhance energy reliability, reduce generator dependence, lower ambient air pollution, and improve urban air quality thereby contributing to better respiratory health outcomes among residents.

Energy Sector Investment and Market Restructuring

There is potential for the financial savings realized from subsidy removal to be redirected toward strengthening infrastructure and supporting energy diversification. These savings may also be channeled into the health sector to enhance service delivery, to achieve this would depends heavily on governance quality and policy implementation ⁽³¹⁾.

Literature further indicates that subsidy withdrawal can enable governments to reallocate resources toward critical health programs or infrastructural improvements ⁽³²⁾.

Several studies suggest that the transition away from fuel subsidies may encourage cleaner energy use, promote the adoption of alternative fuels, and ultimately reduce air pollution yielding positive implications for respiratory health ⁽³³⁾.

As noted by public finance analysts, “Fuel subsidy removal can redirect resources to critical health infrastructure, potentially improving overall population health outcomes.” ⁽³⁴⁾

Additionally, fostering a more competitive downstream petroleum market may enhance national energy security by reducing reliance on imported refined products and mitigating supply bottlenecks in the transportation fuel sector ⁽³⁵⁾.

Policy leverage point: Local and state governments (including Bauchi State) should support this energy transition by:

- Providing incentives for solar installations (e.g., tax breaks, subsidies for solar + battery systems)
- Partnering with firms to build CNG infrastructure in the state
- Encouraging public transport to adopt cleaner-fuel vehicles (CNG or eventually EV)
- Supporting awareness campaigns to educate citizens on long-term savings from alternative energy

Public Choice Theory: Suggests that subsidies are influenced by political motives rather than economic efficiency (Bardhan, 1984), often leading to unintended environmental and health consequences. Subsidies have a range of impacts at both national and global level Economically, they can distort prices and production levels, impede structural adjustment while aggravate budget deficits.

At the international level, subsidies distort trade and competitiveness with adverse impacts on the development prospects of non-OECD countries. With regard to the environment, subsidies can encourage overuse of fossil fuels and other inputs to production or lead to the over-exploitation of resources while contributing to harmful emissions and waste. These ecological impacts easily spill over to the global sphere. Socially, these supports can redistribute income from consumers to producers and distort financial and resource allocations across firms and sectors as well as countries, with adverse effects on overall living standards ⁽³⁶⁾.

Subsidy reform, on the other hand, can lead to fiscal savings, structural adjustment and enhanced efficiency, productivity in the production. Thereby lead to reduction of harmful air pollutant. Subsidies removal can lower effect negative externalities such as pollution and waste. Socially, subsidy reform can lead to a more equitable distribution of income and balanced long-run growth of communities and countries. A more even playing field at international level in the absence of subsidies will benefit both OECD and non-OECD countries. [36] Can as well population health outcome by diverting fund to better health care project, however reduction in air is invariable reducing respiratory tract infection and other related disease.

Diversity Impact of Petroleum Subsidy

1.	2. Domestic	3. Global
4. Economic	5. Prices	9. Trade
	6. Production Levels	10. Competitiveness
	7. Budgets	11. Development
	8.	
12. Environment	13. Pollution levels	16. Climate change
	14. Resource use	17. Loss of biodiversity
	15.	
18. Health	19. Respiratory disease	22. Increase chronic
	20. Injuries and death from	23. Emerging diseases
	21. Road traffic accident	
24. Social	25. Income distribution	27. Equity
	26. Employment	28. Living standard

CONCLUSION

The removal of the petroleum subsidy in Nigeria has not only increased petrol prices but has also reshaped energy choices among citizens. This policy shift is driving many Nigerians including communities within Bauchi Metropolis to explore and adopt alternative energy sources such as solar power. Similarly, the growing use of bicycles and increased walking indicate a transition toward more sustainable mobility practices. These behavioural changes have the potential to support a more diversified, resilient, and environmentally responsible energy landscape. This development aligns with several Sustainable Development Goals (SDGs), namely SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action).

Achieving these benefits, however, requires coordinated efforts involving government policy, private-sector investment, and consumer participation. Moreover, changes in transport behaviour such as increased trekking and cycling are contributing to improved physical fitness among students and workers and may potentially improve their health status.

At the same time, reduced dependence on petrol-powered vehicles, motorcycles, and generators has led to a noticeable decline in air pollution levels, thereby enhancing local air quality across the metropolis and this may reduce triggers of respiratory disease in the study area.

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