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Assessing the Implications of Loadshedding on Academic Workload Management by Preclinical MBChB Students

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Abstract: In technology-driven medical education, uninterrupted access to electricity is critical for effective learning and academic workload management. In South Africa, persistent loadshedding poses a structural challenge to higher education, yet its specific implications for preclinical medical students remain underexplored. This study aimed to assess the impact of loadshedding on academic workload management among preclinical MBChB students at the University of the Free State, with particular attention to workload disruption and academic stress. A quantitative descriptive research design was employed using a self-administered questionnaire. The survey was distributed to second- and third-year MBChB students, yielding an 80.6% response rate (N = 315). Quantitative data were analysed using descriptive statistics, while free-text responses were subjected to thematic analysis to contextualise students' lived experiences and coping strategies during loadshedding. More than half of respondents (56.5%) experienced loadshedding in the preceding 12 months, most commonly for two to four hours per episode, one to three times per week. Half of the students (50.5%) reported that loadshedding negatively affected their academic workload management, and 52.4% indicated increased academic stress. Key challenges included disrupted study routines, inability to prepare for lectures, difficulties accessing digital learning platforms, and missed deadlines. Students residing off campus were disproportionately affected, with 43.0% reporting no access to alternative power sources. Thematic analysis identified seven recurring themes: academic disruption, stress and anxiety, digital challenges, time-management difficulties, minimal impact for some students, occasional positive effects, and broader lifestyle disruptions. This study contributes novel empirical evidence on how infrastructural instability intersects with academic workload management in an intensive medical curriculum. The findings highlight the need for institutional strategies that extend beyond emergency power provision to include digital preparedness, flexible academic support mechanisms, and targeted mental-health interventions. These insights have important implications for educational policy and resource planning in loadshedding-prone contexts.

Keywords: loadshedding, academic workload, medical education, stress management, technology-driven learning environments.

Introduction

An electrical power supply is key to our daily activities. The dependency on electricity has become apparent in the twenty-first century, when technological advancements and rapid information dissemination increasingly define the world. We use electricity in practically every aspect of

human life, from household tasks to entertainment, education and industry, and we often take access to a reliable power supply for granted (Adetokun, 2023; Musa & Adamu, 2025).

The problem results from the increasing digitalisation of higher education, which intensified students' dependence on a stable electricity supply for communication, access to information and lifelong learning during academic engagement (Guze, 2015). The frequent power disruptions have a significant impact on learning and teaching, affecting students' academic performance and, ultimately, influencing the success or failure of an academic institution. In many parts of Africa, power outages remain a pervasive challenge, casting a shadow over both innovation and education.

In Africa, education, the cornerstone of societal progress, is profoundly affected by the pervasive issue of power outages (Adetokun, 2023). Power outages affect students; according to a cross-sectional study conducted in Pakistan with 384 university students (Malik et al., 2022), 71.6% of students who experienced loadshedding reported anxiety, and 73.7% reported stress related to power cuts. A study in South Africa that used a self-administered questionnaire at Sefako Makgatho University found that 100% of participating students experienced emotional stress at the onset of power outages (Thembane, 2024). Furthermore, a study in Ghana explored the link between an erratic power supply and anxiety and stress levels and found that 61.4% of students indicated that 'it has made their work very difficult or worse' (Ibrahim et al., 2016). Power outages can, therefore, heighten the stress levels of university students.

There has also been a shift towards online lectures, and more opportunities are being made available online (Shu et al., 2011). Thus, it has become necessary for students to rely on technology for academic learning, despite excessive use of technology, also known as addiction, being identified at universities (Nwuso et al., 2015). A correlational study conducted in 2015 with undergraduate students reveals that students display a substantial dependence on technology, that is, they use computer-related devices to go about their daily activities, complete projects and assignments, and access lectures (Nwuso et al., 2015). Second Life, an online medical tool, reports more than 1 million regular users, which is evidence of medical students' dependence on technology. This shows that the modern medical student indeed depends on technology as an aid to their education (Guze, 2015).

Research conducted in South Africa with university students found that 44.4% of participants had to use battery-powered devices during study sessions to mitigate the effects of power outages, indicating the use of devices and technology in study spaces (Thembane, 2024). Therefore, because students are so dependent on technology, they are affected by loadshedding, whether in their daily activities, their ability to complete assignments, or their general academic work (Ibrahim et al., 2016). South Africa is a developing country and therefore experiences a range of challenges, such as resource shortages, infrastructure failures, inadequate management, and certain economic issues, which contribute to loadshedding.

Load shedding, which refers to planned power outages during specific periods to prevent grid overload, generally occurs when electricity demand exceeds supply due to insufficient generation capacity, thereby severely affecting and disrupting the regular workflow of various sectors, including higher education (Naidoo, 2023; Yende, 2024). Electricity generation shortages, electricity grid overload, failure to repair electricity facilities, and poor artistry contribute to blackouts. In addition, illegal electricity connections constitute electricity theft and contribute to more frequent loadshedding (Pitikoe-Chiloane & Dondolo, 2024).

Blackouts can differ in timing and duration and can be planned or unplanned. Immediate breakdowns are classified as unplanned and involve blackouts that may last for hours before electricity is restored. In turn, planned outages are scheduled in advance, and the public is notified beforehand.

Intermittent electricity supply prevents a complete blackout in certain areas of South Africa. Thus, load shedding is implemented as a control method to ensure the maximum number of electrical devices are operational at a specific time (Pitikoe-Chiloane & Dondolo, 2024). This leads to power outages lasting at least two hours in various areas, with severity fluctuating depending on the stage of loadshedding. In total, eight stages of load electricity shedding have been established across South Africa in areas supplied by Eskom (South Africa's main electricity supplier). Stage 1 allows for 1,000 MW of electricity to be shed, and Stage 8 allows for 8,000 MW of the national load to be shed (Eskom, 2024). Load shedding usually occurs in two-hour intervals, three to 12 times over four days, depending on the stage of activation (Eskom, 2024).

Context

Looking back, the COVID-19 pandemic forced all learning and teaching activities to move online. Thus, even then, South African higher education institutions had begun to adapt and implement solutions to mitigate loadshedding. These measures included investing in backup power sources such as generators or solar power, implementing energy-saving measures, and adjusting schedules to minimise disruptions during peak loadshedding times (Yende, 2024). However, it is worth noting that the seven South African universities classified as rural-based institutions, namely the Universities of Venda (Limpopo province), Limpopo (Limpopo province), Zululand (KwaZulu-Natal province), Western Cape (Western Cape province), and Fort Hare (Eastern Cape Province), and Walter Sisulu University (Eastern Cape province), and Sefako Makgatho University (Gauteng province) are still subject to loadshedding challenges that affect learning and teaching activities (Yende, 2024).

The University of the Free State (UFS) is one of the higher education institutions that responded to the challenges of loadshedding by investing in backup power sources such as generators and solar power. This meant learning and teaching schedules could be adhered to, and the 39,0% of students who lived in residences on campus could benefit from these resources to navigate their learning and teaching activities. However, the 61,0% of the institutions' students who resided off campus found themselves in accommodation that may or may not have taken measures to mitigate loadshedding (Tlalajoe-Mokhatla, 2024).

This sparked the authors' interest in investigating the implications of load shedding for university students' academic workload. Academic workload refers to the work assigned to a student or an academic that must be completed within a given timeframe (Oxford English Dictionary, 2024). It could take the form of attending lectures, studying the prescribed content, or completing tests and assignments.

In contexts characterised by recurring infrastructural disruptions, such as load shedding, students face sustained interruptions to their access to learning platforms, to prepare for lectures, and to complete academic tasks within prescribed timeframes. While prior studies have documented the general academic and psychological effects of power outages, limited attention has been paid to how such infrastructural instability specifically affects students' ability to manage academic workload effectively, particularly in high-intensity academic programmes (Fayda-Kinik, 2023; Bantjes & Swartz, 2023)
This gap is especially evident in medical education, where students are required to

balance demanding curricula, strict attendance requirements, and extensive independent study within technology-dependent learning environments (Kassab et al., 2025).

This article aimed to assess the implications of load shedding for preclinical MBChB students at UFS in managing their academic workload. Taking professional responsibility, as a medical student, means acquiring knowledge and skills from a variety of sources, such as practical experience, lectures, simulations, and supervised training (Eva et al., 2015). These cumulative aspects of practice may inadvertently have

negative effects on the well-being of medical students (Asani et al., 2016). They could create an environment perceived as stressful and competitive (Swaminathan et al., 2016). These pre-existing stressful atmospheres could be exacerbated by load shedding (Malik et al., 2022). The chosen cohort was involved in the only five-year MBChB degree in the country – the other 10 medical schools offer a six-year MBChB degree. The research focuses exclusively on students in the preclinical years of the programme who face high academic demands, such as attending lectures, tutorials, and practical sessions from 08:00 to 16:00 throughout the academic week. The preclinical MBChB programme is intense and requires an average of 76 hours of study per week (University of the Free State, 2023). Moreover, there is little tolerance for absenteeism; 100% attendance is required, with exceptions for the presentation of death certificates or medical notes, though attendance may not fall below 80% during contact periods of each module (University of the Free State, 2023). Therefore, students in the current programme require an adequate supply of electricity if they are to make use of technology-oriented supporting resources after a formal class setting, when they should make sense of the theoretical content accumulated during didactic lectures, practicals, and tutorials. Thus, to achieve the aim, the study was guided by the following research questions: (1) How does loadshedding affect preclinical MBChB students' ability to manage their academic workload? (2) What academic and psychological challenges do preclinical MBChB students experience because of loadshedding?

Methods

Research design

The study employed a quantitative, prospective, descriptive design. Quantitative descriptive research is a methodological approach that seeks to depict characteristics of a phenomenon or subject under investigation. In scientific inquiry, it serves as a foundational tool for researchers who aim to observe, record and analyse the intricate details of a particular topic. This method provides a rich and detailed account that aids understanding, categorisation, and interpretation of the subject matter (Singh, 2023). This research paper aimed to investigate the implications of loadshedding for the academic workload management of undergraduate medical students. Descriptive research designs systematically observe and document the variables and conditions that influence the subject. As a result, in addition to the options offered by the structured questionnaire, participants could add free-written remarks under the option ‘other’, to give context to their experiences and how they mitigated loadshedding.

Population and sampling

The sample comprised 391 second- and third-year preclinical MBChB students enrolled at UFS in 2025, who were sampled conveniently. The participation was intentional and relied on accessibility, convenience and eagerness to contribute to the study (Pitikoe-Chiloane & Dondolo, 2024). A convenience sampling strategy was used to accommodate students who attended scheduled lectures, during which data were collected efficiently, ensuring a high capture rate in a short timeframe, such as one didactic session. Given the structured timetable and strict attendance requirements of the MBChB programme, convenience sampling was the most feasible and ethically sound method for reaching a large proportion of the sample population without disrupting academic activities. However, the use of convenience sampling may limit the generalisability of the findings, as participants may differ from medical students in other programmes, institutions, or geographical settings. Despite these limitations, a strong response rate may enhance the dataset's credibility and reduce non-response bias. All registered preclinical MBChB students were eligible to participate, thereby promoting gender inclusivity, and there were no age limitations, so that individuals at various stages of young adulthood were included (Engelbrecht et al., 2020).

Data collection

Ethical clearance and permission to conduct the study were obtained from the Health Sciences Research Ethics Committee. A self-report hard-copy questionnaire generated in REDCap was administered to the students in class. The questionnaire incorporated standardised scales for biogeographical data, measuring the frequency of loadshedding occurrence, and data on the management of academic workload, as well as the academic stress that might result from such encounters. Open-ended responses were also incorporated after each section to allow free-written comments, enabling qualitative elaborations on experiences, analysed through thematic synthesis. The identities of the participants were kept private and confidential. The participants were informed that their participation was voluntary and that they were free to withdraw from the study at any time. Moreover, given the descriptive design of the study, the analysis was restricted to reporting observed patterns in the data without inferring causal relationships.

Results

All findings presented in this section reflect descriptive summaries of the data and do not imply causal associations.

Biographical information

This study achieved a response rate of 80.6% (N = 315), of which 51.8% (n = 163) were second-year students and 48.2% (n = 152) third-year students.

Biogeographical information

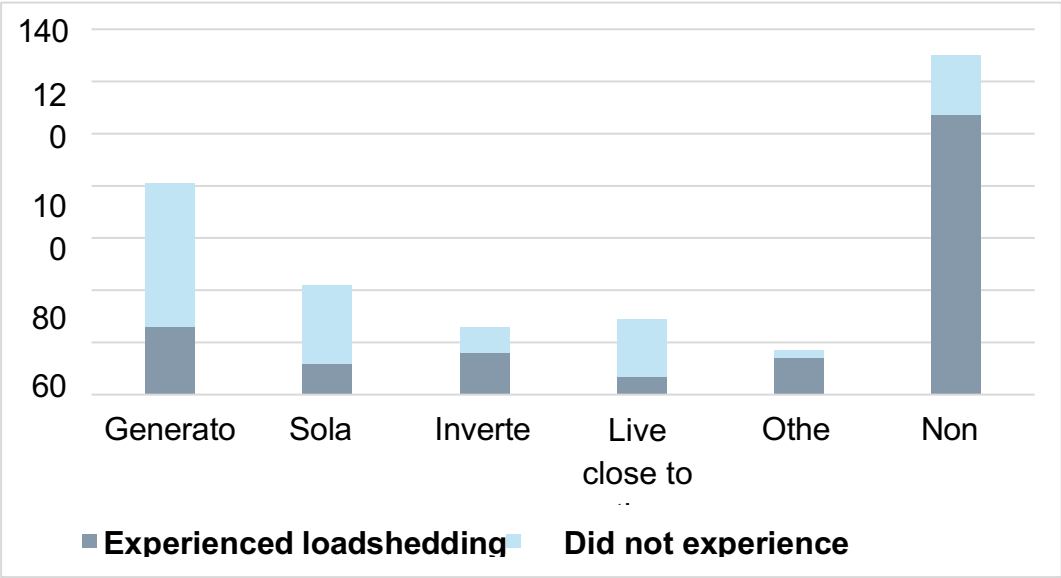
In total, 112 students reported living on campus (35.6%), leaving a significant number of students – 64.4% (n = 203) – living off campus; furthermore, 56.5% (n = 178) of the students had experienced loadshedding over the previous 12 months.

Descriptive analysis

Upon being asked whether they had experienced loadshedding and if they used independent sources of electricity to counteract it, participants selected options that were offered as follows (*cf*. Figure 1): Of the N = 315 respondents, 26.8% (n = 81) used generators as alternative power source, 13.9% (n = 42) used solar power, 8.6% (n = 26) used inverters, 9.6% (n = 29) reported to be living close to hospital and, thus, benefited from the hospital's alternative power sources and 5.6% (n = 17) had other forms of alternative power supplies. Meanwhile, 43.0% (n = 130) reported having no alternative power supply during load shedding.

Figure 1

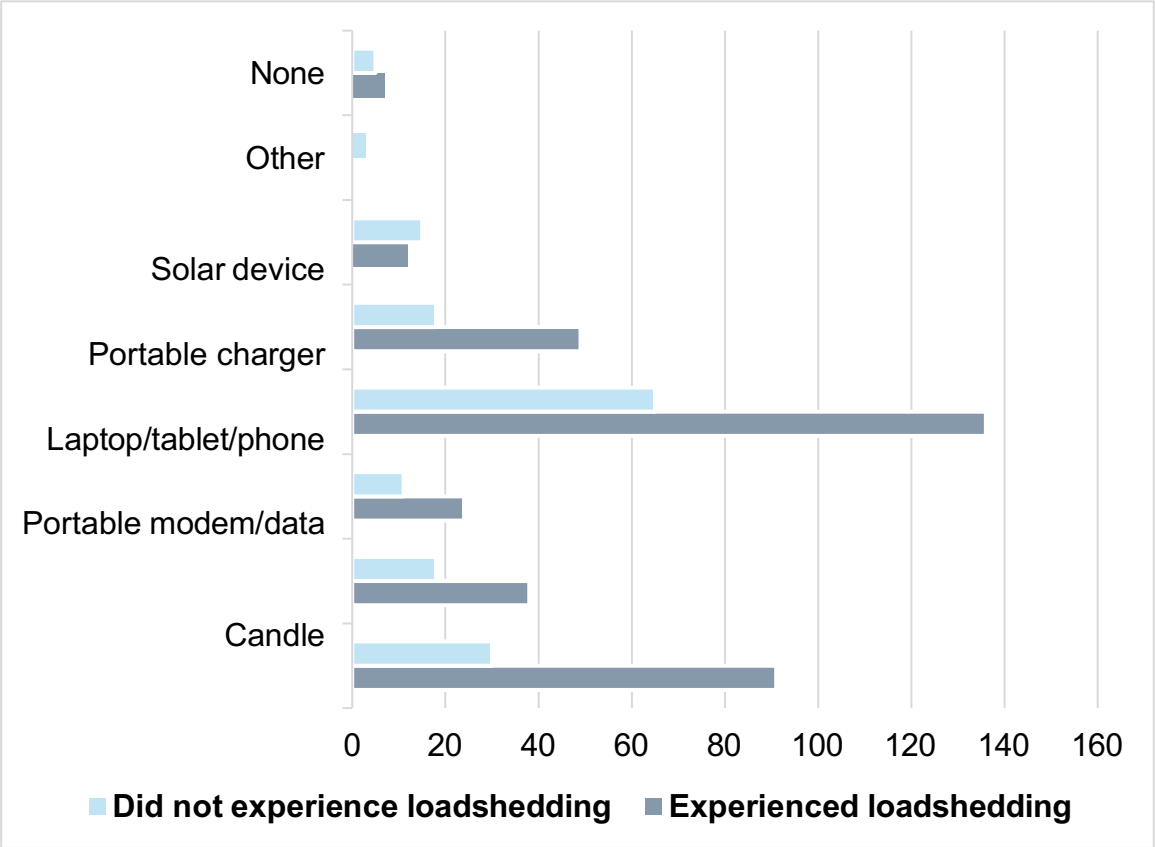
Alternative source of power supply used during loadshedding



In addition to reporting on alternative sources of power they used during loadshedding, the participants were asked about their backup power devices. The figure (*cf.* Figure 2) reports the responses of sources denoted as backup power.

Figure 2

Modes of backup power



The clustered bar chart in Figure 2 shows the multiple options available. Of the 64.4% (n = 203) students who lived off campus, 99.0% (n = 201) had laptops/tablets/phones, 59.6% (n = 121) had emergency lights, 33.0% (n = 67) had portable chargers, 22.7% (n = 46) had candles, 22.2% (n = 45) portable modems/data, 13.3% (n = 27) had solar devices, 5.9% (n = 12) had no backup power and 1.5% (n = 3) had other forms of backup power in addition to the sources listed.

Furthermore, among participants who reported experiencing loadshedding, 178 reported the duration of loadshedding per day, which ranged from 2 to more than 6 hours (*cf.* Table 1).

Table 1

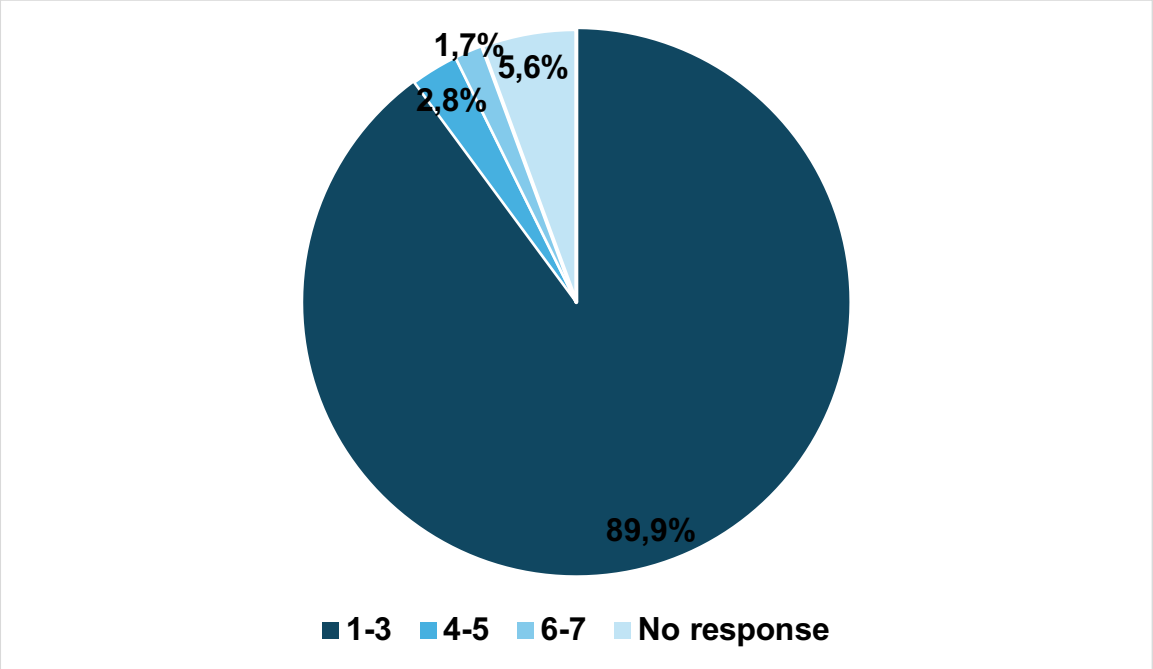
The number of hours per day students experienced loadshedding

Hours	Frequency (**n=**)	**Percentage (%** of **N=178)**
2	116	65.2
4	37	20.8
6	3	1.7
6+	21	11.8
No response	1	0.5

The students also reported how many days per week they experienced loadshedding (*cf.* Figure 3).

Figure 3

Number of days per week students experienced loadshedding



Concerning Table 1 and Figure 3, of the N = 178 students who experienced loadshedding, most – 65.2%; n = 116 – experienced it for 2 hours a day, and a significant number of the students – 89.9%; n =

160 – experienced it on between 1 and 3 days per week. Having established that loadshedding was experienced by the students and how they mitigate such events, the following section will consider the implications of loadshedding for students' academic workload management. Figure 4 reports students' responses to the question of whether loadshedding affected their workload.

Figure 4

Did loadshedding affect your academic workload?

According to Figure 4, of the N = 279 responses, 50.5% (n = 141) stated that their academic workload was affected by loadshedding, while 49.5% (n = 138) reported that their academic workload was not affected by loadshedding. Further context was gained from the students' responses to a request to report on the activities they engaged in during loadshedding (cf.

Figure 5

Activities engaged in during loadshedding

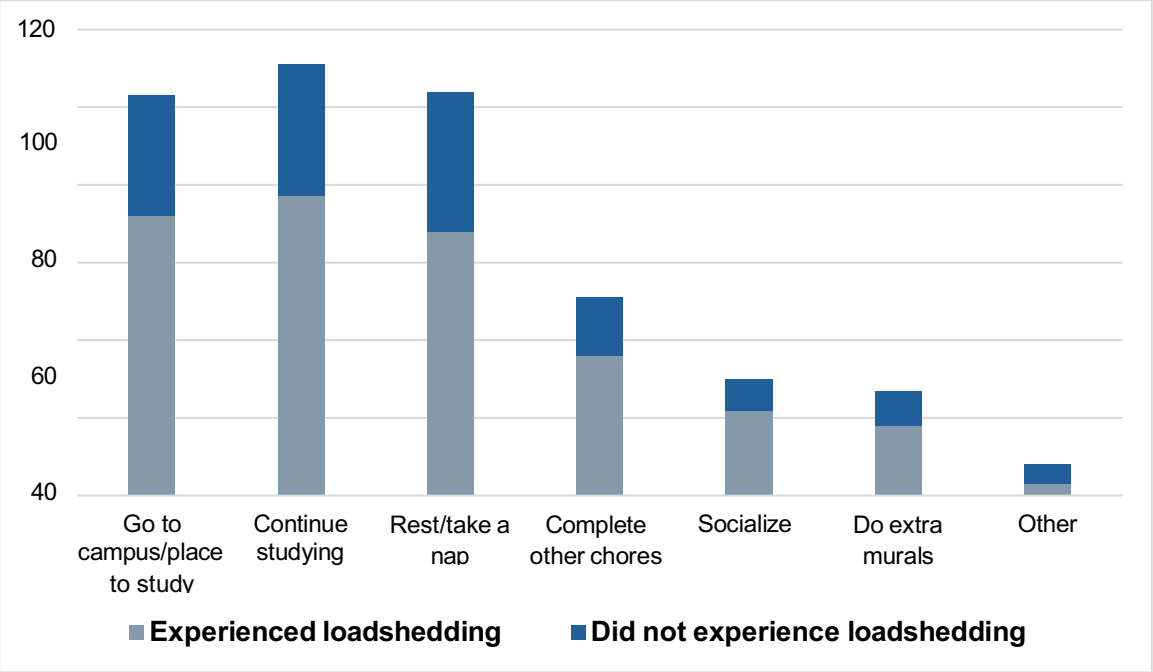
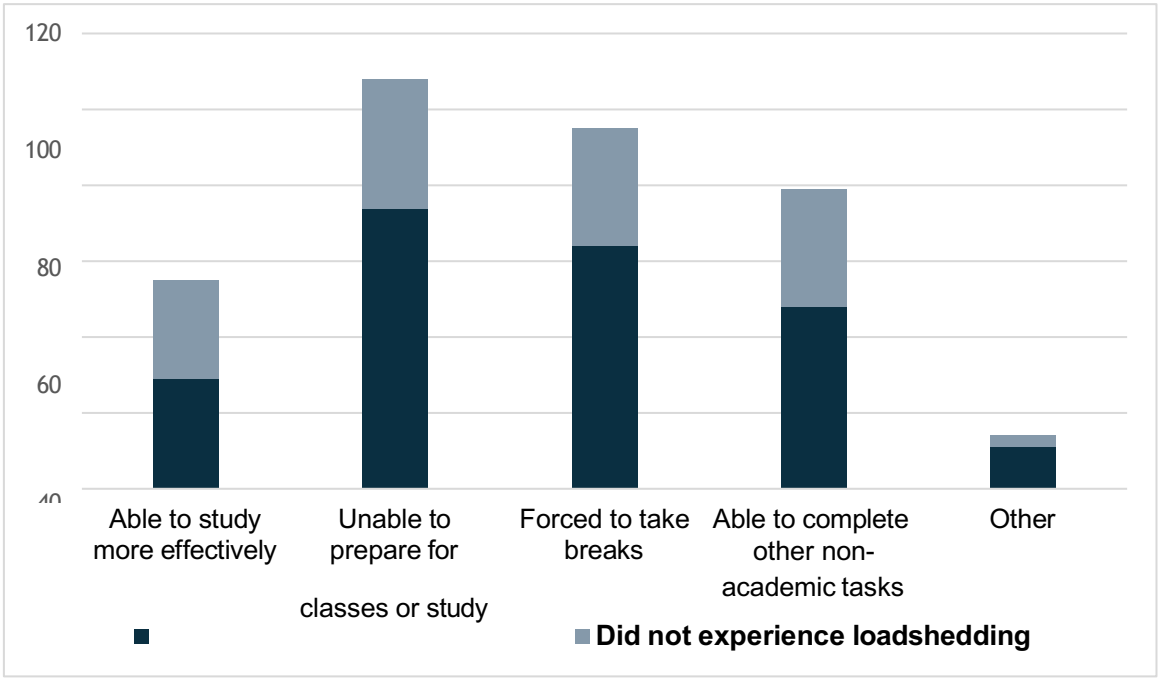


Figure 5 presents students' reports of the activities they engaged in to pass the time during loadshedding. In total 39.2% (n = 103) opted to go to campus or to find alternative places to study, 42.2% (n = 111) continued to study, 39.5% (n = 104) rested or took a nap, 19.4% (n = 51) attended to other chores, 11.4% (n = 30) socialised, 10.3% (n = 27) engaged in extramural activities and 3.0% (n = 8) engaged in other activities not listed. The effect of loadshedding was also investigated in relation to the management of academic workload, and Figure 6 depicts the students' profiles on activities they engage in during loadshedding.

Figure 6

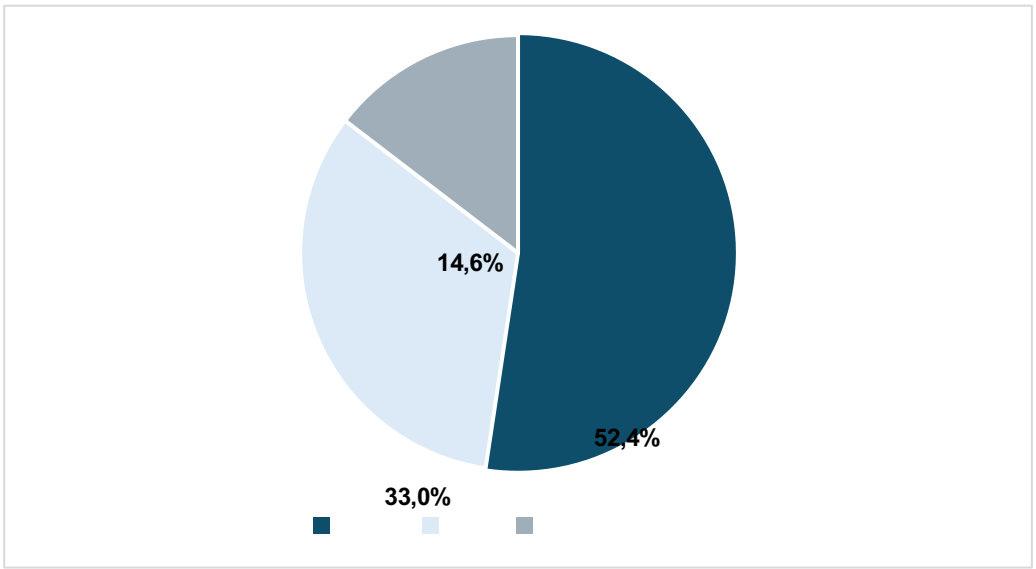
Effect of loadshedding on managing the academic workload of medical students



According to Figure 6, as a result of loadshedding, 20.8% (n = 55) of the students could study more effectively, 40,9% (n = 108) were unable to prepare for lectures or to study, 36.0% (n = 95) were forced to take breaks, 29.9% (n = 79) completed other non- academic tasks, and 5.3% (n = 14) said that they experienced other effects on managing academic workload which were not mentioned in the questionnaire as possible options. A proportion of students reported being unable to prepare for lectures during load shedding. Given the close relationship between academic workload and academic stress, it was pertinent to investigate whether load shedding increased the academic stress students experienced (*cf*. Figure 7).

Figure 7

Does loadshedding cause additional academic stress

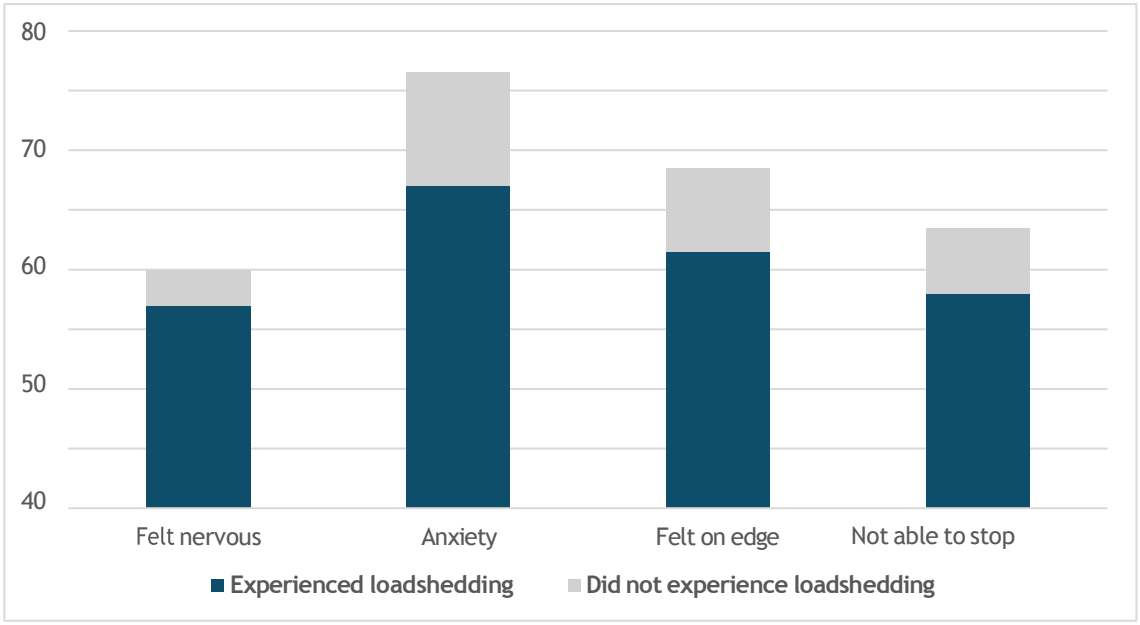


In Figure 7, 52.4% (n = 165) of students self-reported heightened academic stress during loadshedding, 33.0% (n = 104) reported no additional stress, and 14.6% (n = 46) did not respond. This finding shows that the implications of loadshedding went beyond academics and also affected the mental health and well-being of a large proportion of students.

Furthermore, students described the stress they experienced (*cf.* Figure 8), which had initially been termed as academic stress.

Figure 8

Descriptions of academic stress experienced by medical students during loadshedding

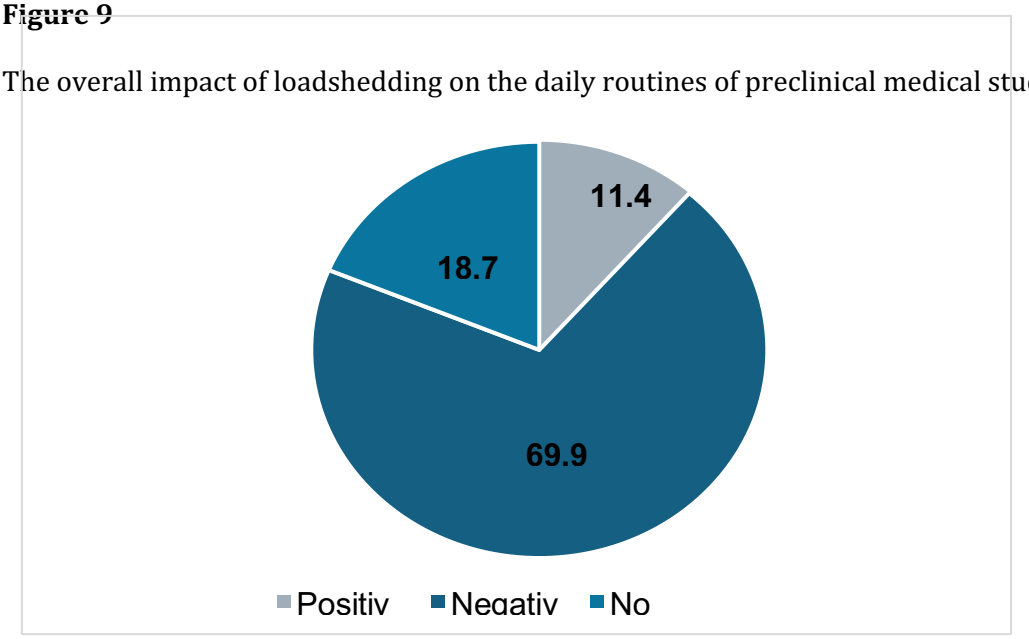


As shown in Figure 8, 24.5% (n = 40) experienced nervousness, 44.8% (n = 73) were anxious, 35.0% (n = 57) felt on edge, and 28.8% (n = 47) were unable to stop themselves from worrying.

The last question addressed the overall impact of load shedding on students' daily routines (*cf.* Figure 9).

Figure 9

The overall impact of loadshedding on the daily routines of preclinical medical students



According to Figure 9, a significant number, 69.9% (n = 220) of the students reported the overall impact of loadshedding on their daily routines as negative, 11.4% (n = 36) of students reported otherwise, and the remaining 18.7% (n = 59) did not respond to this question.

Thematic analysis of free-written text

The 315 students who participated in this study comprised 51.8% (n = 163) second-year students and 48.2% (n = 152) third-year students. A significant number of the students – 80.6% (n = 254) - engaged further by free- writing comments; 87.1% (n = 142) from the second year and 73.7% (n = 112) from the third year articulated themselves. Thematic synthesis was applied to analyse the comments (Thomas & Harden, 2008), and seven themes were identified for both semesters (Table 2). These thematic findings provide context for the quantitative findings discussed above.

Table 2

Identified themes from the free-written comments made by the medical students

Themes (N = 254)	Semester 2 (N = 142)	Semester 4 (N = 112)
1. Academic navigation (N = 60)	Students (**n = 42**) reported that loadshedding disrupted their ability to complete academic tasks and forced them to postpone or leave work incomplete. Much of their studying and assignments took place at home, so outages severely hindered their progress. Safety concerns arose when they had to return from campus late at night, and some students reported that their marks declined. Even though students were unaffected by loadshedding acknowledged its potential to derail academic workload management.	Students (**n = 18**) reported that loadshedding hindered their ability to meet daily academic goals, including studying, attending online lectures and completing assignments. Common issues included poor lighting and unusable digital devices, disrupted preparation and failure to meet deadlines. Some (n = 6) had to abandon work entirely, leading to accumulated workloads and delays.
2. Stress and anxiety (N = 32)	Loadshedding caused psychological distress (**n = 14**). They reported anxiety, a sense of falling behind, and demotivation. This stress was exacerbated during periods of high academic demand, such as tests or assignment deadlines.	Students (**n = 18**) reported that loadshedding triggered anxiety and caused low morale and emotional exhaustion, which compounded existing academic stress. The uncertainty and lack of control over schedules led to mental strain. Students (n = 10) described repeated interruptions as discouraging and demotivating, which caused fear of falling behind, sleep disruption, procrastination, and reduced focus.
3. Digital challenges (N = 52)	Students (**n = 32**) reported that outages rendered digital devices unusable, which disrupted learning activities. Lack of light and Wi-Fi, and low battery life compromised access to essential resources. Some (n=7) were unable to charge devices, which made it impossible to access online platforms such as Blackboard, engage in self-study, or meet deadlines.	Students (**n = 20**) expressed that even senior students relied heavily on digital access. Issues such as low device battery power, no access to Wi-Fi, and the inability to charge laptops disrupted productivity. They struggled to access Blackboard, online tools, and essential resources, which made it impossible to retrieve notes, attend virtual sessions, or complete
	Their dependence on digital tools left students without an alternative way to continue studying during outages.	tasks. One student noted being unable to access key academic tools such as Google or AI platforms.

4. Time management (N = 46)	Students (n = 30) referred to challenges relating to adjusting their academic schedules (n = 7) to accommodate unpredictable outages, which made time management more difficult. The interruptions caused their study routines to break down, leading to inefficient learning and delayed progress. Students (n = 5) reported that they had to take breaks and do non-academic tasks, which wasted time that was meant for studying.	Students (n = 16) explained how power outages changed their established routines and study workflows. Some mentioned that they (n = 8) were forced to take unplanned and unproductive breaks, which affected their efficiency and extended the time needed to complete tasks. They were forced to alter planned study sessions and reallocate their time less efficiently. The absence of a stable environment affected their ability to follow a consistent academic schedule.
5. Positive impact (N = 26)	Several students (n = 11) reported that loadshedding unexpectedly created a quieter, less distracting environment that improved focus and productivity. Some (n = 4) concentrated better without noise and light, while others (n = 2) studied more effectively because there was no other entertainment. A few (n = 5) used the time to rest or do planning, then worked harder when power returned. Some even found themselves more productive with fewer digital distractions. While challenging for most, a small group viewed outages as opportunities to refocus and enhance study habits.	Of the students (n = 15), a few (n = 7) reported fewer distractions during outages, and they used the time for rest, planning, or offline academic activities. Some (n = 8) reported that, while loadshedding was inconvenient, the outages did not significantly affect their academic workload.
6. Minimal impact (N = 17)	A small group of students (n = 14) reported that power outages had little to no effect on their academic work. They managed to continue their studies through non-digital methods or used the time to engage in lower-effort tasks such as reviewing hard copies. One student stated that they had backup devices.	A minority (n = 3) of students reported no substantial disruptions. They noted that, with preparation, they could manage or that the timing of outages did not interfere with their routines. One student adapted by changing their study environment by going to a friend's place or studying earlier in the day.
7. Other factors (N = 41)	Some students (n = 11) highlighted the physical impact of outages, such as the inability to cook food, poor lighting affecting their eyes, and not being able to sleep properly, which affected their sleep and studying patterns. These factors caused fatigue, reduced concentration, and worsened academic performance.	Several students (n = 30) reported that loadshedding severely disrupted their ability to study, especially in the evenings when light and digital access were essential. Inability to work in the dark or access online materials led to incomplete assignments and growing backlogs. Some (n = 10) struggled to maintain productivity when they had to relocate or pause studies, resulting in frustration and poor performance. Others stopped studying altogether, took unplanned breaks, or opted to sleep, which caused guilt and low motivation. A few (n = 3) noted hunger and discomfort from not being able to cook, which further reduced focus. Overall, outages directly hindered academic performance, increased emotional strain, and caused a notable decline in productivity and motivation.

Discussion

The biographical information did not include collecting data on gender and age, nor were there limitations set on gender, ethnicity, home language, living conditions, year of birth, and relationship status

(Engelbrecht et al., 2020). The findings on biogeographical information coincide with those of Tlalajoe-Mokhatla (2024), namely that 61.0% of students at institutions who reside off campus are in accommodation that may or may not have taken measures to mitigate loadshedding.

Figures 1 and 2 indicate a significant number of students having to navigate loadshedding because they lived in off-campus accommodation that did not provide the means to do so. It has been reported that an unreliable power supply – loadshedding – prompts people to invest in alternative, affordable power sources (Wiese & Van der Westhuizen, 2024). To avoid grappling with recurring and severe power crises, households should invest in backup devices such as inverters, uninterrupted power supplies, small generators and solar energy systems (Jamil & Ul Islam, 2023). This study found that students were tasked with finding alternative ways to navigate load shedding because many of their accommodations lacked solar energy systems, inverters, or generators.

Regarding Table 1 and Figure 3, the frequencies of loadshedding correlate with findings by Kgarose et al. (2024), who report that frequent loadshedding disrupts e-learning and online assessments and forces students to rely on expensive mobile data or alternative study locations. Students from disadvantaged backgrounds are disproportionately affected by loadshedding, as they do not have access to generators or backup power solutions. The unpredictability of power cuts increased stress and made it difficult for students to plan their academic work (Kgarose et al., 2024) and caused frustration and anger (Bangani, 2024). A study conducted in Ghana found that frequent load shedding led to connectivity problems and the unpredictability of power outages, generating anxiety among students, as they were uncertain whether they would be able to attend online lessons and access educational materials (Ibrahim et al., 2016).

After confirming in Figure 4 that load shedding affects students' academic workload. Figure 5 findings are consistent with those of Thembane (2024), who reports that 66.7% of students at a tertiary institution napped during loadshedding. In Thembane's study, the practices least engaged in by the students were socialising (11.4%) and extramural activities (10.3%). When comparing the findings of this study with those of Thembane, 86.7% of students interacted with others during load shedding. A study in Pakistan reported similar findings: 59.0% of students engaged in interaction with others as a practice during load shedding (Malik et al., 2022). Our findings differ from other studies. Our students could have collaborated with friends and formed study groups with students in unaffected areas, but they had safety concerns. This reinforces our finding that a large proportion of students visited the campus or other study locations. This could explain why the results for visiting friends are low. Figure 6 aligns with Thembane's (2024) findings, in which 100% of students in their study reported that their preparation for assessments and examinations was affected by loadshedding (Thembane, 2024). Furthermore, Kgarose et al. (2024) report that frequent load shedding disrupts e-learning and online assessments, making it difficult for students to plan their academic work and resulting in substandard preparation for projects and assignments.

Most students used loadshedding as an opportunity to take a break from studying. They were forced to do this because many indicated that device charging interruptions contributed to this difficulty. After all, the place where they studied required power (for light, for instance), and certain study materials required power to access them. Thembane (2024) reports that 73.3% of students in their study used loadshedding periods to take breaks and practice self-care.

In this study, 71.4% (n = 199) of students reported that they were unable to study during loadshedding because, when a student is unable to prepare for lectures or reflect on content covered, they are expected to be unable to engage with the subject content. The researchers conclude that if students are unable to prepare for lectures due to limited device charging during loadshedding, it is likely that they were also unable to study for assessments and examinations. This finding is consistent with that of Malik et al. (2022), who report that when loadshedding occurs, students tend not to attend lectures, have less

time to study, and face challenges with assignment submission. Thembane (2024) reinforces this notion, as 100% of the students experienced disruption of their study routine. Certain students were able to complete other tasks, possibly because, when one task is halted, another can be completed.

Pungwa and Reddy (2024) found that 72.7% of university students experienced negative effects of loadshedding. Connectivity issues limited students' ability to access academic materials from online learning management systems. Furthermore, technological disruptions during assessments caused stress and frustration (Ibrahim et al., 2016; Bangani, 2024; Pungwa & Reddy, 2024). These findings align with the challenges faced by preclinical MBChB students at the UFS and reinforce that technological dependence may intensify academic vulnerability during infrastructural disruptions and may affect academic performance in higher education.

Furthermore, in Figure 8, Thembane (2024) confirms that loadshedding affects students' mental health by reporting that 100% of students experienced mental and emotional stress, such as anxiety, during loadshedding. A study that focused on students in a music faculty reports on the challenges students faced during loadshedding, which affected their stress levels. Students encountered challenges in utilising learning platforms during loadshedding, which impeded their academic advancement and induced stress (Yende, 2024). Individuals with access to reliable power supplies were likely to maintain a more consistent work routine than those without, placing those reliant on unstable power sources at a disadvantage and contributing to their stress levels (Octaviani, 2021). Thus, the occurrence of frequent loadshedding led to students experiencing heightened anxiety and stress and required them to catch up on coursework after interruptions (Ibhrahim et al., 2016). Phiri et al. (2021) confirm this finding and report that challenges emerged when students were required to submit assignments and adhere to deadlines despite power outages, which exacerbated their stress (Phiri et al., 2021). Lastly, as shown in Figure 9, students perceived a negative impact on their daily routine, and they reported increased stress during load shedding (Li et al., 2022). This would indicate that, in this population, the effects of power outages could have a far greater negative impact on their studies, extending to their emotional well-being. The literature created an expectation that students would be greatly affected by power outages; this was indeed the case in this study. Thus, the findings of this study align with the literature on the negative impact of loadshedding on students' academic workload management and the perpetuation of stress (Ibrahim et al., 2016; Li et al., 2022; Malik et al., 2022; Pungwa & Reddy, 2024; Thembane, 2024). The thematic analysis revealed what was highlighted in the quantitative findings.

Recommendations

Recommendations that emerged from this study, which had the aim of investigating how students navigated loadshedding challenges to manage their academic workload, are the following:

- Institutional support: Access to backup power solutions (generators, solar systems) in student residences and study spaces should be expanded, and designated 24/7 on-campus study areas with guaranteed power during outages should be provided. Among the population sampled for this study, those who lived on campus benefited from the institution's backup power supply. However, the many students who lived off campus could not benefit from these solutions.

- Digital preparedness: Students should be encouraged to download offline resources from licensed platforms that allow this, and to maintain printed study materials for certain chapters or subjects. Also, training should be provided on time-management strategies for coping with unpredictable outages, meaning faculty must intentionally create more flexible, collaborative work within timetable schedules to accommodate academic support services.

- Mental health interventions: A proactive timetable, scheduled group-based stress management

programmes, and counselling services tailored to students affected by loadshedding should be implemented, as it is evident that students experience additional psychological challenges.

- Policy and collaboration: Policymakers in higher education must advocate for partnerships between universities and accredited off-campus accommodation service providers to prioritise a stable electricity supply for accommodation deemed credible for housing off-campus students.

Limitations

The study experienced a few limitations.

- Sample scope: The study focused on second- and third-year preclinical MBChB students at a single institution, limiting generalisability.
- Self-reported data: Reliance on questionnaires may introduce response bias.
- Temporal context: Findings reflect conditions during a specific academic year and may vary with changes in loadshedding patterns or institutional interventions.

Conclusion

This study demonstrates that loadshedding substantially affects the academic workload management of preclinical MBChB students by disrupting the conditions necessary for effective study and preparation. Empirically, over half of participants had experienced loadshedding in the preceding year, most commonly for two hours per episode and on one to three days per week. Among those affected, 50.5% reported a negative impact on their academic workload, indicating difficulties maintaining study routines, preparing for lectures, and completing tasks within required timeframes. The findings also highlight the emotional burden associated with power interruptions, with 52.4% of students reporting increased academic stress and experiencing symptoms such as nervousness, anxiety, and difficulty concentrating during loadshedding. Collectively, these results show that infrastructural instability intersects with both the practical and psychological dimensions of workload management in a technology-dependent medical curriculum.

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Ethics statement

The authors followed the highest standards of ethical conduct in their research. The study was approved by the University of Free State Health Sciences Research Ethics Committee (HSREC-UFS-HSD2024/0413/2910).

Potential conflict of interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of this article.

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