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Low Back Pain Among Taxi Drivers at Kuala Lumpur International Airport: A Preliminary Cross-Sectional Study

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ABSTRACT

This study investigated the prevalence and risk factors associated with low back pain (LBP) among taxi drivers at Kuala Lumpur International Airport, Malaysia. A quantitative cross-sectional design was employed, and data were collected using structured questionnaires from 47 drivers. The findings revealed a high prevalence of LBP, with 85.1% of drivers working alternating shifts reporting symptoms. Drivers who worked prolonged hours (8–12 hours daily) and those receiving less than one rest day per week also showed high prevalence rates of 66.0% and 48.9%, respectively. Statistical analysis indicated that smoking status was significantly associated with LBP (p = 0.031), while years of driving experience and daily working duration were also significantly related to LBP (p < 0.05). The study highlights the importance of ergonomic interventions, occupational health education, and regular health monitoring to reduce LBP among professional drivers. Improvements in vehicle ergonomics, promotion of healthy lifestyle practices, and routine medical examinations are recommended to enhance drivers' well-being, improve job satisfaction, and reduce the economic burden associated with musculoskeletal disorders in the transportation sector.

Keywords: ergonomic, low back pain, musculoskeletal disorder, risk factors, taxi drivers

1. INTRODUCTION

Transportation plays a vital role in linking production with consumption, facilitating the movement of industries, capital, and populations, and ultimately sustaining regional economic development. As societies become increasingly dependent on transportation services, the number of professional drivers has grown, exposing this workforce to various occupational health risks, particularly musculoskeletal disorders (MSDs). Previous studies report that the prevalence of MSDs among professional drivers ranges widely from 43.1% to 93.0% with low back pain (LBP) consistently identified as the most common complaint, occurring in approximately 17.0% to 82.9% of drivers [1]. Empirical evidence further indicates a significant association between longer daily driving hours and the onset of LBP. Globally, LBP is recognized as one of the most frequent work-related MSDs. In 2020, an estimated 619 million individuals experienced LBP. Projections suggest that this number will rise to about 843 million individuals by 2050, marking a 36.4% increase compared with 2020 [1]. LBP is a highly prevalent and significant health problem that affects a substantial proportion of the global population, particularly among occupational groups such as drivers. It is widely recognized as one of the leading causes of disability and work absenteeism worldwide, with prevalence rates varying considerably across populations and work settings. Among professional drivers, point prevalence

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estimates of LBP range from 19% to 54%, while lifetime prevalence has been reported to reach as high as 77% in some studies [2,3]. Beyond its adverse effects on physical functioning and quality of life, LBP imposes a considerable economic burden on healthcare systems, employers, and affected individuals through increased medical costs, productivity loss, and absenteeism.
Taxi drivers operating at major transportation hubs, such as Kuala Lumpur International Airport (KLIA), are exposed to a unique combination of occupational risk factors. These include prolonged sitting and immobility, irregular and extended work shifts, repetitive trunk movements, and manual handling tasks such as lifting and transporting passenger luggage. Such cumulative biomechanical and ergonomic exposures have been shown to substantially increase the risk of developing chronic LBP [4,5]. Despite a growing body of international literature on work-related LBP among drivers, local Malaysian evidence remains limited, particularly in relation to airport-based taxi drivers whose work demands, and operational patterns differ from those of urban taxi drivers.

Existing Malaysian studies indicate that drivers represent one of the occupational groups with a high burden of LBP, with key contributing factors including prolonged sitting, long working hours, manual handling, and suboptimal ergonomic conditions [6]. National occupational health research further highlights that work-related musculoskeletal disorders among drivers are closely associated with vehicle seat design, lack of adjustability, prolonged driving duration, and cumulative mechanical exposure [7]. In parallel, the Ministry of Health Malaysia emphasizes the importance of medical surveillance and fitness assessments for vocational drivers as part of broader efforts to mitigate health-related risks that may compromise both driver wellbeing and public safety [8].

Against this backdrop, findings from the present study will provide critical, context-specific evidence to inform transport authorities, airport management, and occupational safety and health practitioners. Such evidence is essential for the development and implementation of targeted preventive strategies, including ergonomic seat improvements, structured rest-break policies, and targeted health screening programs tailored to the needs of airport-based taxi drivers.

1.1 Taxi drivers and low back pain.

Drivers, including taxi and bus operators, are particularly vulnerable to LBP due to the nature of their work, which often involves prolonged periods of sitting, repetitive movements, and exposure to whole-body vibrations. The ergonomic challenges faced by drivers, such as inadequate seat support, poor posture, and the physical demands of driving, contribute significantly to the development of LBP. For example, a comparative study among taxi drivers in Iran and Pakistan found that the lifetime prevalence of LBP was as high as 77.7% in Pakistani drivers and 72.3% in Iranian drivers [3].

1.1.1 Factors of low back pain.

Several factors contribute to the high incidence of LBP among drivers, with ergonomic factors playing a central role. In particular, inadequate vehicle seat design, lack of lumbar support, and prolonged adoption of suboptimal driving postures have been consistently identified as key contributors to increased spinal loading, muscle fatigue, and the development of low back pain among professional drivers [9,10]. A study conducted in Turkey found that drivers with a body mass index (BMI) of 25 or higher were significantly more likely to report LBP [2]. Additionally, psychosocial factors, including job stress and dissatisfaction, have been linked to increased pain perception [3]. Lifestyle factors, such as physical inactivity and smoking, further exacerbate the risk of developing LBP [11,12].

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Moreover, environmental factors, including road conditions and vehicle quality, play an important role in influencing the prevalence of LBP among drivers. Poorly maintained roads and prolonged exposure to whole-body vibration generated by vehicle movement have been shown to increase spinal loading and mechanical stress, thereby contributing to discomfort, fatigue, and low back pain among professional drivers [13,14,15]. In particular, driving on uneven or degraded road surfaces can amplify vibration and repeated shocks transmitted through the vehicle seat to the spine, heightening the risk of musculoskeletal pain and injury. Therefore, the present study investigates the prevalence of LBP among taxi drivers operating at Kuala Lumpur International Airport (KLIA) and examines its associations with socio-demographic, physical, and occupational factors.

1.2 Conceptual Framework of the Study

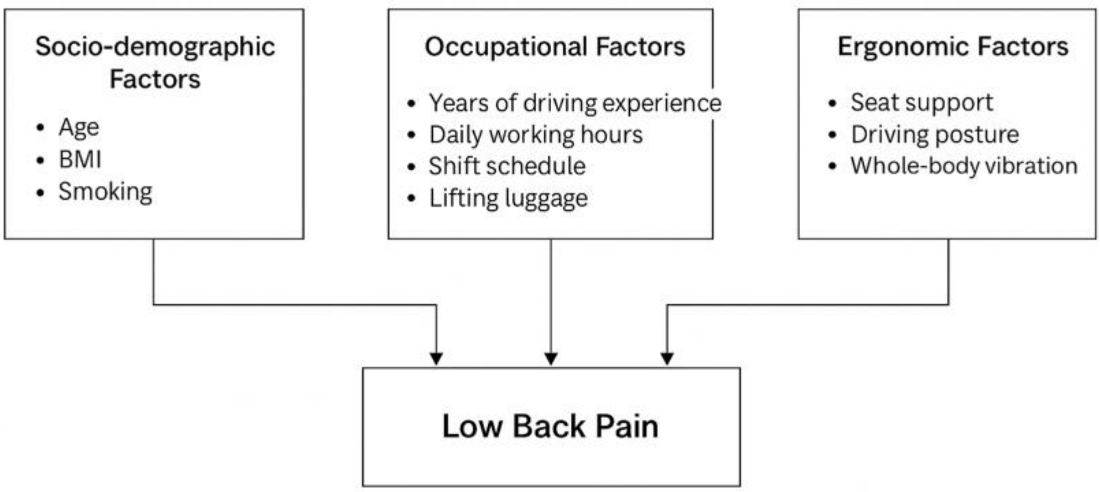

Figure 1: Conceptual Framework of the Study on low back pain among taxi drivers

Based on figure 1, the conceptual framework for this study illustrates the multidimensional factors contributing to LBP among taxi drivers at KLIA. Based on the research, the framework proposes that LBP arises from the combined influence of socio-demographic, occupational, and ergonomic factors. These three categories collectively explain both personal vulnerabilities and work-related exposures that increase the likelihood of developing LBP among taxi drivers.

Socio-demographic factors represent individual characteristics that may expose drivers to musculoskeletal strain. Age is associated with natural spinal degeneration, whereas higher BMI increases mechanical loading on the lumbar spine [16, 17]. Smoking is included due to its documented effects on reduced tissue oxygenation and accelerated intervertebral disc degeneration [18]. Together, these variables may create personal risk profile that influences an individual's susceptibility to LBP [19, 20].

Occupational factors such as years of driving experience, daily working hours, shift schedules, and manual handling tasks may lead to LBP problems. Prolonged driving exposes taxi drivers to static postures, limited movement, and fatigue, while long-term driving experienced reflects cumulative exposure to whole-body vibration and repetitive strain. Irregular or extended shift patterns may reduce rest periods, further compromising musculoskeletal recovery. Additionally, lifting luggage introduces acute biomechanical stress that can precipitate or worsen lower back symptoms. These factors represent direct job-related demands that place continuous physical load on the spine. [21, 22, 23].

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Ergonomic factors, such as seat support, driving posture, and exposure to whole-body vibration, address the physical environment within the vehicle. Poor seat design and suboptimal posture can lead to improper lumbar alignment, resulting in discomfort and chronic strain. Whole-body vibration, a well-recognized occupational hazard in professional driving, has been consistently linked to increased LBP risk [24, 25].

Overall, the conceptual framework posits that LBP among taxi drivers results from the interaction of personal characteristics, occupational exposures, and ergonomic conditions. By integrating these domains, the framework provides a structured basis for the study's variables, analysis, and interpretation of findings, highlighting the multifactorial nature of LBP in driving occupations. [26, 27, 28].

2. MATERIAL AND METHODS

This study used a quantitative cross-sectional design to determine the LBP among taxi drivers at KLIA and to identify the factors. A cross-sectional approach was chosen because it allows the collection of data on exposures and health outcomes at one point in time, making it suitable for studying occupational health issues among workers with irregular schedules. The study population consisted of registered taxi drivers operating at KLIA. A total of 47 drivers participated in the study. Convenience sampling was used, as drivers' working hours and unpredictable trip schedules made random sampling difficult. Drivers were approached during their rest periods at the KLIA taxi holding area, and participation was voluntary.

2.1 Data Collections

Data were collected using a modified Standardized Nordic Musculoskeletal Questionnaire (NMQ), which is a widely used and validated tool for identifying musculoskeletal symptoms. The questionnaire was adapted to include additional sections on socio-demographic information (such as age, BMI, smoking status), occupational factors (such as years of driving experience, daily working hours, and shift patterns), ergonomic conditions (such as seat support and driving posture), and lifestyle habits. The instrument had been reviewed for content validity by experts in occupational safety and ergonomics, and reliability was ensured through internal consistency checks. The reliability analysis for the pilot study showed that the questionnaire achieved a Cronbach's Alpha value of 0.73, indicating an acceptable level of internal consistency. The Cronbach's Alpha coefficient above 0.70 demonstrates that the instrument is reliable and suitable for actual data collection. Therefore, the questionnaire items were retained for the main study. Before the data collection began, permission was obtained from the taxi cooperative and airport authorities. Respondents were informed about the purpose of the study, and written consent was obtained. Confidentiality and anonymity were assured, and participants were allowed to withdraw at any time without any consequences.

2.2 Data Analysis

Data were analysed using IBM SPSS Version 20.0. Descriptive statistics were used to summarise the characteristics of the participants, including their age, BMI, years of experience, and working hours. Frequencies and percentages were calculated for categorical variables, while means and standard deviations were used for continuous variables. To examine associations between low back pain and independent variables, chi-square tests were performed. A p-value of less than 0.05 was considered so that the results are statistically significant. Ethical considerations were observed throughout the study and participation was voluntary, no personal identifiers were collected, and all information was handled with strict confidentiality.

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3. RESULTS AND DISCUSSION

Based on Table 1 below, it shows the demographic and lifestyle characteristics of the respondents, including age, gender, body mass index (BMI), and smoking status. These characteristics provide an important information for interpreting the occupational risk factors associated with low back pain and other work-related health outcomes. In terms of age distribution, the largest proportion of respondents fell within the 29–39 years age group (40.4%), followed by those aged between 40–49 years (27.7%). Older age groups constituted smaller proportions, with 19.1% aged between 50–59 years and 12.8% between aged 60–69 years. This distribution indicates that the workforce was predominantly composed of individuals in their early to mid-working age, which may influence both physical capacity and exposure to occupational demands.

Regarding gender, the sample was overwhelmingly male dominated, with 87.2% of respondents being male and only 12.8% female. This imbalance likely reflects the gender composition of the industry under study and suggests that the findings are more representative of male workers, particularly in physically demanding occupations as a taxi drives.
Analysis of BMI showed that nearly half of the respondents were classified as overweight (48.9%), while 46.8% fell within the normal BMI range. A smaller proportion of respondents were categorised as obese (4.3%). The high prevalence of overweight individuals may be of concern, as excess body weight has been associated with increased mechanical loading on the lumbar spine and a higher risk of musculoskeletal disorders [29]. Furthermore, insufficient engagement in healthy lifestyle activities, including regular exercise and physical fitness routines, may contribute to poor musculoskeletal health among drivers. Professional drivers often experience limited time for physical activity due to prolonged working hours and sedentary occupational demands, which may indirectly increase the risk of low back pain.

Analysis of BMI showed that nearly half of the respondents were classified as overweight (48.9%), while 46.8% fell within the normal BMI range. A smaller proportion of respondents were categorised as obese (4.3%). The high prevalence of overweight individuals may be of concern, as excess body weight has been associated with increased mechanical loading on the lumbar spine and a higher risk of musculoskeletal disorders [29]. With respect to smoking status, more than half of the respondents were non-smokers (57.4%), while 42.6% reported being smokers. Although non-smokers constituted the majority, the relatively high proportion of smokers may still have implications for musculoskeletal health, as smoking has been linked to reduced tissue oxygenation and delayed musculoskeletal recovery [30].

Table 1 Sociodemographic Characteristics of Taxi Drivers (N = 47)

Characteristic	Category	Frequency (%)
Age	29 – 39 years	40.4
	40 -49 years	27.7
	50 -59 years	19.1
	60 – 69 years	12.8
Gender	Male	87.2
	Female	12.8
BMI	Normal	46.8
	Overweight	48.9
	Obese	4.3
Smoking status	Smoker	42.6
	Nonsmoker	57.4

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Based on Table 2 below, it shows the distribution of LBP prevalence across selected occupational factors, including work schedule, years of experience, daily working hours, rest days, and lumbar support usage. Based on the findings, it has been discovered that several work-related characteristics are strongly associated with the presence of LBP among respondents. Based on the work schedule, a notably high proportion of workers engaged in alternating shifts reported experiencing LBP (85.1%), compared to only 14.9% who did not report symptoms. This suggests that irregular or rotating shift patterns may contribute substantially to musculoskeletal strain, potentially due to disrupted circadian rhythms, inadequate recovery time, and cumulative physical fatigue [1]. In terms of years of experience, workers with 1–5 years of experience showed a moderate prevalence of LBP (42.6%), while those with 5–10 years demonstrated a considerably lower prevalence (12.8%). Interestingly, the prevalence increased again among workers with more than 10 years of experience (44.7%). This non-linear trend may reflect an initial adaptation phase, followed by long-term cumulative biomechanical loading and age-related degeneration affecting the lumbar region [31].

Analysis of daily working hours revealed a clear association between prolonged work duration and LBP. Workers operating 8–12 hours per day reported a high prevalence of LBP (66.0%), whereas those working less than 8 hours showed substantially lower prevalence (8.5%). Although the prevalence among those working more than 12 hours was lower than the 8 to12-hour group (25.4%), it remains elevated compared to shorter working durations, indicating that extended exposure to physical demands is a significant risk factor [32]. Regarding rest days, workers receiving less than one rest day per week demonstrated a relatively high prevalence of LBP (48.9%). Insufficient recovery time may limit musculoskeletal repair processes and exacerbate fatigue-related postural deviations, thereby increasing susceptibility to low back disorders. [33] stated a healthy working condition is indicated by a ratio of 9 hours work with a 30-minute rest break after 5 hours, and a total daily limit of 12 hours.

Finally, the results for lumbar support usage show that a very high proportion of workers who reported using lumbar support also experienced LBP (93.6%). This finding may suggest that lumbar support is more commonly adopted as a reactive intervention following the onset of pain rather than as a preventive measure. Alternatively, improper design, incorrect usage, or overreliance on support devices may fail to adequately mitigate lumbar loading during work activities.

Table 2 Prevalence of LBP by Occupational Characteristic

Occupational factor	**Category**	**LBP Yes (%)**	**LBP No(%)**
Work Schedule	Alternating shift	85.1	14.9
Years of experience	1-5 years	42.6	57.4
	5- 10 years	12.8	87.2
	> 10 years	44.7	55.3
Daily working hours	<8 hours	8.50	91.5
	8- 12 hours	66.0	34.0
	>12 hours	25.4	74.6
Rest days	< 1 day	48.9	51.1
Lumbar support	yes	93.60	6.40

The findings in Table 3 of this study demonstrated a statistically significant association between smoking status and low back pain (LBP) among taxi drivers ($p = 0.031$). Drivers who smoked were more likely to report symptoms of LBP compared to non-smokers. This finding is consistent with previous studies suggesting that smoking may contribute to spinal degeneration, reduced blood circulation to intervertebral discs, and impaired musculoskeletal recovery, thereby increasing susceptibility to lower back disorders.

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In addition, years of driving experience and daily working hours were significantly associated with LBP ($p < 0.05$). Drivers with longer occupational exposure and extended working durations appeared to have a higher risk of developing lower back symptoms. Prolonged driving may expose workers to sustained static posture, repetitive spinal loading, and whole-body vibration, all of which are recognised occupational risk factors for musculoskeletal disorders among professional drivers.

Although body mass index (BMI) did not show a statistically significant association with LBP in this study, overweight drivers demonstrated a higher prevalence of lower back pain compared to drivers with normal BMI. This observation suggests that excess body weight may still contribute to increased mechanical stress on the lumbar spine and may potentially aggravate musculoskeletal discomfort among drivers. LBP and smoking status were significantly correlated ($p = 0.031$). LBP was also associated with years of experience and the length of daily working hours ($p < 0.05$). It's interesting to note that overweight drivers had a higher prevalence of LBP, indicating that BMI may play a role, even if it was not statistically significant.

Table 3 Correlation between smoking status and low back pain

Variables	Significance value (p)
Smoking status and low back pain	0.031

The present study identified a considerable prevalence of LBP among taxi drivers operating at KLIA. The findings support previous international evidence indicating that professional drivers are among the occupational groups most vulnerable to musculoskeletal disorders, particularly LBP. Prolonged sitting, repetitive spinal loading, restricted body movement, and exposure to whole-body vibration during driving are recognised occupational hazards that contribute to lumbar discomfort and chronic musculoskeletal strain. The prevalence observed in this study is comparable with findings reported in previous studies involving professional drivers in several countries. [34] reported that professional drivers globally experience a high burden of LBP, with prevalence rates varying widely depending on driving duration, ergonomic exposure, and work organisation. Similarly, [35] found that prolonged driving hours and static sitting posture significantly increased the likelihood of developing LBP among bus drivers in Bangladesh. These similarities suggest that occupational driving environments, regardless of country, expose drivers to similar biomechanical stressors.

In the Malaysian context, taxi drivers at airports may face additional occupational challenges due to irregular trip schedules, long waiting periods, traffic congestion, and the frequent handling of passenger luggage. These factors may cumulatively increase spinal loading and muscular fatigue over time. Therefore, the current findings reinforce the importance of occupational health interventions targeting professional drivers, especially those involved in long-distance and airport transportation services. This study demonstrated a statistically significant association between smoking status and LBP among taxi drivers. Smokers were more likely to report LBP symptoms compared to non-smokers. This finding is consistent with previous research suggesting that smoking negatively affects spinal health through several biological and physiological mechanisms. Smoking has been associated with reduced blood circulation to spinal tissues, impaired oxygen supply to intervertebral discs, and accelerated degenerative changes in spinal structures. [36] explained that nicotine exposure may interfere with nutrient transport to spinal discs, resulting in tissue degeneration and increased vulnerability to musculoskeletal pain. In addition, smoking may impair tissue healing and prolong inflammatory responses, potentially worsening pain perception among affected individuals.

Recent evidence also suggests that smoking may indirectly contribute to LBP through reduced physical fitness and increased fatigue levels. Drivers who smoke may be less physically active and more likely to adopt unhealthy lifestyle behaviours, further increasing musculoskeletal risk.

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Considering the high proportion of smokers identified in this study, workplace health promotion programmes focusing on smoking cessation may help reduce long-term musculoskeletal complications among taxi drivers. The findings revealed that drivers with longer working experience and extended daily driving hours were significantly associated with LBP. Drivers who had worked for more than 10 years demonstrated a higher prevalence of LBP, indicating the cumulative effects of prolonged occupational exposure. Long-term driving exposes individuals to continuous static posture, repetitive trunk movements, and prolonged exposure to whole-body vibration, all of which contribute to spinal stress and muscular fatigue.

Similarly, drivers working between 8 and 12 hours daily reported the highest prevalence of LBP. Extended driving duration limits opportunities for postural changes and muscular recovery, increasing lumbar compression and discomfort. These findings are consistent with earlier studies conducted among professional drivers and transport workers. [37] reported that long working duration was a significant predictor of LBP among truck drivers in Ethiopia. Likewise, [38] highlighted that excessive working hours may increase fatigue, reduce recovery time, and contribute to occupational injuries and musculoskeletal disorders. Airport taxi drivers may also experience psychological stress related to passenger demands, irregular schedules, and income dependency. Combined physical and psychosocial stressors may further increase muscle tension and pain perception. Therefore, interventions such as scheduled rest breaks, stretching exercises, workload management, and ergonomic education should be considered to minimise prolonged spinal loading among drivers.

Although body mass index (BMI) was not statistically associated with LBP in this study, overweight drivers demonstrated a higher tendency to experience lower back discomfort. Excess body weight increases mechanical pressure on the lumbar spine and may accelerate degenerative changes in spinal joints and discs. [39] explained that obesity and overweight conditions alter lumbosacral alignment, increasing stress on spinal structures and contributing to postural imbalance. The findings also highlighted the importance of occupational and ergonomic factors in the development of LBP. Most respondents reported using lumbar support while driving; however, a high proportion still experienced LBP symptom. This may indicate that lumbar support is commonly used after the onset of pain rather than as a preventive strategy. In some cases, inappropriate seat adjustment or poor-quality lumbar support may fail to provide adequate spinal protection.

Whole body vibration remains another important occupational exposure among drivers. Continuous exposure to vehicle vibration, particularly during long-distance driving and poor road conditions, may contribute to spinal microtrauma and muscular fatigue. Previous ergonomic studies have consistently identified poor seating design, awkward posture, and prolonged sitting as major contributors to LBP among drivers. These findings collectively demonstrate that LBP among taxi drivers is multifactorial in nature, involving interactions between personal characteristics, occupational exposure, ergonomic conditions, and lifestyle habits. Addressing only one factor may not sufficiently reduce the burden of LBP. Therefore, comprehensive intervention programmes involving ergonomic improvements, health promotion, regular screening, and occupational safety education are strongly recommended.

4. CONCLUSION

Based on the correlations found for smoking status, driving experience, and daily working hours, the study's findings demonstrate the multifaceted nature of LBP among cab drivers. These findings highlight the necessity of focused interventions that address these risk variables and are in line with previous research. To reduce the risk of LBP among drivers, future initiatives should emphasize on healthy lifestyle choices, ergonomic enhancements in vehicle design, and routine health examinations. Reducing the frequency of LBP and improving the general well-being of this occupational group depend on addressing these problems.

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APPENDIX

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