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Original Research Article

Frequency and determinants of missed appointments in the outpatient clinics of a tertiary care Hospital

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ABSTRACT

Background: Missed outpatient appointments remain a major challenge in healthcare delivery, leading to inefficient resource utilization, longer waiting times and disrupted continuity of care. This descriptive cross-sectional study assessed the rate and factors contributing to missed appointments among patients attending the outpatient department of a tertiary care hospital.
Methods: A total of 100 patients who missed their scheduled appointments were included. Data were collected using a structured questionnaire and analyzed using SPSS version 26 with descriptive statistics, chi-square tests and Pearson's correlation.
Results: Most participants were urban residents (66%), aged 25–40 years (61%) and self-employed or employed in small private enterprises (60%). Forgetfulness (mean=4.05) and lack of appointment reminders (mean=4.00) were the leading reasons for non-attendance. No significant association was found between appointment reminders or work-related obligations and missed appointments ($p>0.05$). However, forgetfulness showed a significant positive correlation with missed appointments ($r=0.392$, $p<0.001$). Distance from the hospital was not significantly associated with non-attendance ($p=0.525$).
Conclusions: Behavioural and healthcare system–related factors, particularly forgetfulness and limited rescheduling flexibility, had a greater influence on missed appointments than demographic or geographic factors. Strengthening reminder systems, simplifying rescheduling and improving patient awareness may enhance appointment adherence and outpatient efficiency.

Keywords: Appointment adherence, Healthcare management, Missed appointments, Outpatient attendance, Tertiary care hospital

INTRODUCTION

Missed hospital appointments are a common problem worldwide, with non-attendance rates ranging from 5% to 30% and even higher in some specialties such as mental health services.[1] Missed appointments reduce healthcare efficiency by wasting clinical resources, increasing waiting times and limiting access for other patients. In the United Kingdom, they place a significant burden on the NHS through loss of consultation hours and increased financial costs.[2] Studies have identified several factors associated with missed appointments, including age, financial difficulties, waiting time, distance from hospitals, forgetfulness, transportation issues, work commitments and poor understanding of appointment systems.[5,6] Common reasons for non-attendance include forgetting appointments, difficulty in cancelling or rescheduling, inconvenient timings, illness and symptom improvement before the visit.[8,9] Timely attendance is important for continuity of care, better clinical outcomes and patient satisfaction.[7] To reduce missed appointments, healthcare systems have introduced strategies such as telephone reminders, SMS alerts, postal notifications,

telemedicine services and improved booking systems.[11,13] However, the effectiveness of these interventions varies across settings and populations.[10]

Studies from Latin American outpatient settings have reported limited evidence on the causes of non-attendance, with cultural, social and healthcare access factors influencing appointment adherence.[12] Understanding these reasons is important for developing targeted interventions to improve attendance, patient care and clinic efficiency, especially in teaching hospitals. The present study was conducted to examine missed appointments among patients attending a cancer outpatient clinic. It aimed to measure the rate of missed appointments and identify major patient-related and system-related factors responsible for non-attendance.

The study also assessed the influence of behavioural, occupational and accessibility-related factors such as appointment reminders, work commitments, forgetfulness and distance from the hospital on appointment adherence. Statistical analysis was performed to identify the key determinants of outpatient non-attendance in a tertiary care hospital setting.

Accordingly, Healthcare system–related factors were formulated and are as follows.

H_{01}

There is no significant association between receiving an appointment reminder and attendance at the scheduled outpatient visit.

H_{11}

Receiving an appointment reminder significantly increases the likelihood of attending the scheduled outpatient visit.

H_{02}

There is no significant association between work-related commitments and missed appointments.

H_{12}

Work-related commitments significantly contribute to missed appointments.

H_{03}

There is no significant relationship between forgetfulness and the rate of missed appointments.

H_{13}

Forgetfulness is significantly associated with the rate of missed appointments.

H_{04}

There is no significant relationship between distance from the hospital and missed appointments.

H_{14}

Distance from the hospital is significantly associated with missed appointments.

METHODS

Study design

This study used a descriptive cross-sectional design based on primary data collection to assess the prevalence and reasons for missed outpatient appointments in a tertiary care hospital.

Cross-sectional surveys are commonly used to study healthcare utilization and health-related behaviour.[22] Open-ended questions were also included to understand patients' experiences and perceptions, adding a qualitative component to the study.[23]

Study setting and duration

The study was conducted in the Outpatient Department (OPD) of a tertiary care teaching hospital with a centralized online appointment booking system. Data were collected from March to August 2024.

All major clinical departments using the online appointment system were included to improve representation and generalizability of the findings.

Study population

The study population included patients who booked online OPD appointments but did not attend or cancel them. These patients were identified through electronic hospital records.

Inclusion criteria

People who are 18 years old or older. Patients who made an appointment for an OPD visit online but did not show up on the day they were supposed to. Patients whose contact information is up to date in the appointment database. Patients who agreed to take part in the trial.

Exclusion criteria

Patients who showed up for their appointments on time. Patients who called beforehand to cancel or change their appointments. Patients whose contact information is missing or wrong. Patients who said no when asked to participate.

Sample size determination

We used the calculation for a single percentage to figure out the sample size we needed.[24]

where Z is the standard normal value for a 95% confidence level (1.96), *p* is the probability of the number of incorrect appointments (assumed to be 0.5 as the most variable) and d is the desired accuracy (0.1). The sample size that was calculated was 96. This number was increased to 100 in order to compensate against the probability of lack of responses.

Sampling procedure

A stratified random sampling technique was used to ensure representation from major clinical departments. Patients who missed appointments were identified from the electronic booking database and randomly selected using computer-generated random numbers. If a patient could not be contacted after three attempts, another patient from the same department was selected.[25,26]

Data collection tool

A structured questionnaire was developed based on previous literature.[27] It included four sections: sociodemographic details, appointment-related information, reasons for missed appointments and suggestions to improve appointment adherence. Common reasons for non-attendance included forgetfulness, work commitments, transportation problems, illness and family emergencies. An open-ended section was also included for additional responses. The questionnaire was pilot tested on ten participants to assess clarity and understanding. Minor changes were made before final data collection.

Data collection procedure

After approval from the institutional ethics committee, the hospital's electronic appointment database was reviewed daily to identify patients who missed scheduled appointments. Eligible participants were contacted by telephone within 3–5 days of the missed appointment. The study purpose was explained and verbal informed consent was obtained.

Interviews lasted about 10–12 minutes and were conducted using a standardized interview guide. Participants were encouraged to give detailed responses to open-ended questions. Completed questionnaires were checked for completeness before data entry.[28]

Data quality assurance

Multiple quality assurance measures were implemented to ensure data quality and reliability. Interviewers received standardized training on communication, ethical conduct and minimizing interviewer bias. Data collection was supervised by a senior investigator and approximately 15% of questionnaires were randomly reviewed for accuracy and completeness. Data were double-entered in Microsoft Excel, cross-validated and cleaned using logical consistency and range checks before analysis in SPSS.

Data analysis

Data were analysed using IBM SPSS Statistics version 26. Descriptive statistics such as frequencies, percentages, means and standard deviations were used to summarize the data. The chi-square test was used to assess associations between categorical variables, while Pearson's correlation coefficient was used to examine relationships between variables such as forgetfulness, distance and missed appointments. A p-value of <0.05 was considered statistically significant. The questionnaire showed good reliability, with a Cronbach's alpha value of 0.830.

Ethical considerations

Participation in the study was voluntary and verbal informed consent was obtained from all participants before data collection. Confidentiality was maintained by excluding personal identifiers from the dataset. Study data were accessible only to the research team and stored securely on password-protected computers. The study followed the ethical principles of the Declaration of Helsinki and national biomedical research guidelines.[29]

Limitations and bias reduction

The study faced challenges such as recall bias and non-response. To reduce recall bias, participants were contacted soon after missing their appointments. Standardized training minimized interviewer bias, while confidentiality helped reduce social desirability bias. Although the cross-sectional design limited causal interpretation, the study provided useful information on behavioural and logistical factors related to missed appointments.

Data analysis and interpretation

This study analysed data from 100 patients who missed scheduled outpatient appointments at a tertiary care hospital to identify the main reasons for non-attendance and examine the influence of sociodemographic and healthcare system factors. Data were analysed using SPSS version 26 with descriptive and inferential statistics, including frequencies, means, standard deviations, chi-square tests, correlation and regression analysis.

RESULTS

Reliability testing

Reliability analysis was conducted using Cronbach's alpha to assess the internal consistency of the 24 Likert-

scale items. A value above 0.70 indicates acceptable reliability of the questionnaire.[30]

The Cronbach's alpha value for the 24 items scale was 0.830, indicating good internal consistency. This suggests that the questionnaire reliably measured the behavioural, sociodemographic and system-related factors related to missed outpatient appointments.

Socio-demographic profile of respondents

As shown in figure 1, most respondents were male (55%), from urban areas (66%) and aged 25–40 years (61%). Most participants were educated, employed in private work or self-employment (60%) and belonged to the middle-income group (69%). Around 75% lived within 15 km of the hospital, indicating good geographic access. The findings suggest that working-age urban individuals may miss appointments due to occupational and time-related constraints.

Appointment and communication characteristics

As per table 1, missed appointments were highest in the Paediatrics (18%) and Ophthalmology (16%) departments. Mobile applications (34%) and telephone booking (27%) were the most common appointment booking methods. Most patients booked appointments shortly before the visit date. Although 76% received appointment reminders, 24% did not receive any reminder. Only 18% attempted rescheduling. The findings suggest the need for better reminder systems and easier rescheduling options to reduce missed appointments.

Analysis of reasons for missed appointments

This section provides a descriptive analysis of the various reasons, which make people miss their outpatient visits. The responses were scored based on a five-point Likert scale (1 being Strongly Disagree and 5 Strongly Agree). The mean values are higher indicating that the majority of people hold the view that that is one of the reasons.

The main reasons for missed outpatient appointments were forgetfulness (Mean=4.05), failure to receive reminders (Mean=4.00), complexity of the booking system (Mean=4.02) and transportation difficulties (Mean=3.99). Work-related commitments (Mean=3.82) and financial constraints (Mean=3.81) were also commonly reported. Illness, hospitalization and inconvenient clinic timings were less frequently reported causes (Table 2). Overall, behavioural and logistical factors were the major reasons for non-attendance. Most respondents found the online appointment system user-friendly (Mean=4.02) and considered reminder messages helpful (Mean=3.95). However, ease of cancelling or rescheduling appointments received lower ratings (Mean=2.74). Participants preferred reminders in their native language (Mean=4.00) and supported follow-up communication after missed appointments (Mean=3.85) (Table 3). Overall, the findings suggest that improving rescheduling options and patient-centred communication may help reduce missed appointments.

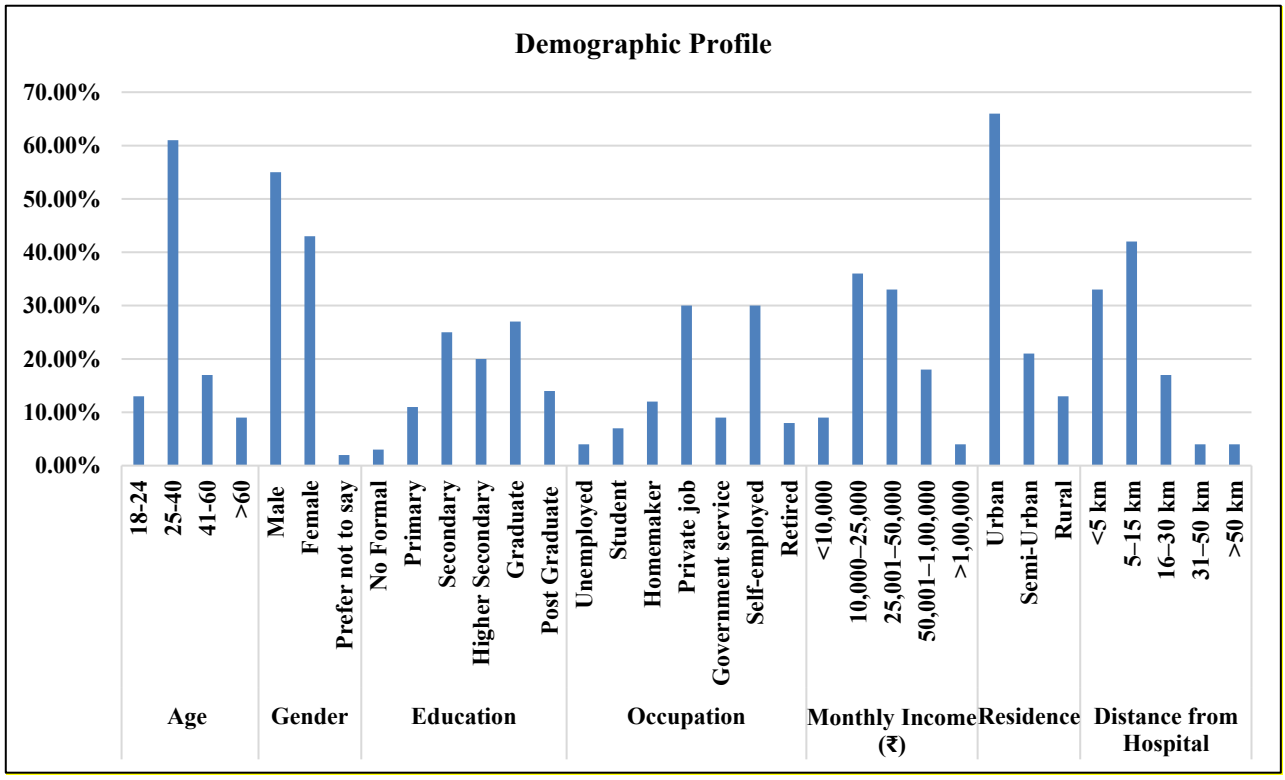

Figure 1: Demographic profile of outpatient respondents in the study.

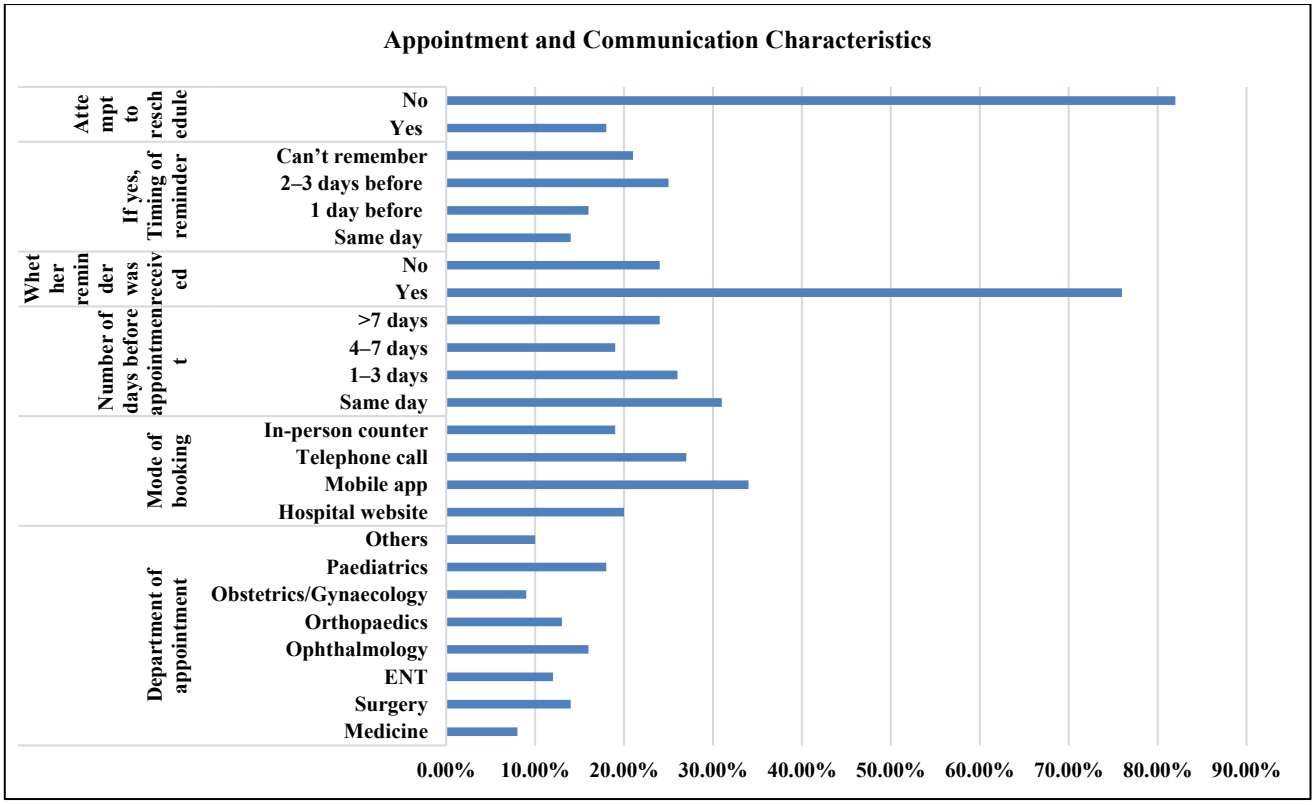

Figure 2: Trends in appointment scheduling and reminder receipt among outpatients.

Most respondents considered hospital appointments important for their health (Mean=3.89). However, forgetfulness remained a major reason for missed visits (Mean=3.97). Participants also felt that flexible appointment timings would improve attendance (Mean=3.95) (Table 3). The findings suggest that flexible scheduling and better reminder systems may improve appointment adherence.

Respondents supported strategies to reduce missed appointments. Reducing OPD waiting times received the highest agreement (Mean=3.61), followed by online rescheduling options (Mean=3.29). Automated reminders and patient education programs also received moderate support (Mean=2.91) (Table 4). The findings highlight the importance of efficient and patient-centred appointment management systems.

Hypothesis testing

H_{01}

There is no significant association between receiving an appointment reminder and attendance at the scheduled outpatient visit.

H_{11}

Receiving an appointment reminder significantly increases the likelihood of attending the scheduled outpatient visit.

Chi-square analysis was used to assess the association between appointment reminders and outpatient attendance. As per table 5, most respondents found reminders helpful (62%) and 67% preferred reminders in their native language. However, as per table 5, reminder-related variables were not statistically significant ($p>0.05$). The associations between appointment attendance and sufficient reminders ($p=0.677$) and automated reminder effectiveness ($p=0.622$) were not significant. Therefore, the null hypothesis (H_{01}) was accepted.

H_{02}

There is no significant association between work-related commitments and missed appointments.

H_{12}

Work-related commitments significantly contribute to missed appointments. Chi-square analysis was used to assess the association between work-related factors and missed outpatient appointments. As per table 6, no statistically significant association was found between work commitments ($p=0.813$), inconvenient appointment timings ($p=0.084$) and missed appointments. Although the likelihood ratio test suggested a possible association for appointment timing ($p=0.016$), the Pearson chi-square test was not statistically significant. Therefore, the null hypothesis (H_{02}) was accepted.

H_{03}

There is no significant relationship between forgetfulness and the rate of missed appointments.

H_{13}

Forgetfulness is significantly associated with the rate of missed appointments. Pearson's correlation analysis was used to assess the relationship between forgetfulness and missed outpatient appointments. As per table 7, forgetfulness was commonly reported as a reason for missed appointments (M=4.05, SD=0.64). A moderate positive and statistically significant association was found between forgetfulness and missed appointments ($r=0.392$, $p<0.001$). Therefore, the null hypothesis (H_{03}) was rejected.

H_{04}

There is no significant relationship between distance from the hospital and missed appointments.

H_{14}

Distance from the hospital is significantly associated with missed appointments.

Pearson's correlation analysis was used to assess the relationship between distance from the hospital and missed outpatient appointments. As per Table 8, most respondents lived within 5–15 km of the hospital (M=2.04, SD=1.01). A weak and non-significant association was found between distance and missed appointments ($r=0.064$, $p=0.525$). Therefore, the null hypothesis (H_{04}) was accepted.

Table 1: Distribution of respondents by appointment and communication characteristics (n=100).

Variables	Categories	Frequency	%
Department of appointment	Medicine	8	8.0
	Surgery	14	14.0
	ENT	12	12.0
	Ophthalmology	16	16.0
	Orthopaedics	13	13.0
	Obstetrics/Gynaecology	9	9.0
	Paediatrics	18	18.0
	Others	10	10.0
Mode of booking	Hospital website	20	20.0
	Mobile app	34	34.0
	Telephone call	27	27.0
	In-person counter	19	19.0
Number of days before appointment	Same day	31	31.0
	1–3 days	26	26.0
	4–7 days	19	19.0
	>7 days	24	24.0
Whether reminder was received	Yes	76	76.0
	No	24	24.0
If yes, Timing of reminder	Same day	14	14.0
	1 day before	16	16.0
	2–3 days before	25	25.0
	Can't remember	21	21.0
Attempt to reschedule	Yes	18	18.0
	No	82	82.0

Table 2: Patient-related reasons for missed appointments.

Descriptive statistics					
	N	**Min**	**Max**	**Mean**	**Std. Deviation**
Forgot appointment date time	100	2.00	5.00	4.0500	0.64157
Work or job commitment	100	2.00	5.00	3.8200	0.71605
No reminder received	100	2.00	5.00	4.0000	0.55048
Confusing booking system	100	3.00	5.00	4.0200	0.51208
Transportation difficulty	100	2.00	5.00	3.9900	0.54114
Felt better no need	100	1.00	5.00	3.9000	0.70353

Continued.

Descriptive statistics					
Health or hospitalized	100	1.00	5.00	2.9100	1.32646
Family or personal emergency	100	1.00	5.00	3.2900	1.01797
Inconvenient appointment time	100	1.00	5.00	2.9100	1.32646
Financial limitation	100	1.00	5.00	3.8100	0.72048
Valid N (listwise)	100				

Table 3: Factors effecting missed appointments.

Descriptive statistics of system and communication related factors					
	N	**Min**	**Max**	**Mean**	**Std. Deviation**
Online system user-friendly	100	2.00	5.00	4.0200	0.49196
Sufficient reminders provided	100	1.00	5.00	3.8700	0.73382
Reminder assists attendance	100	1.00	5.00	3.9500	0.85723
Reminder messages clear	100	2.00	5.00	3.8200	0.71605
Local language reminder preference	100	2.00	5.00	4.0000	0.55048
Easy reschedule or cancel	100	1.00	5.00	2.7400	1.30748
Staff should follow up	100	1.00	5.00	3.8500	0.60927
Valid n (listwise)	100				
Descriptive statistics of attitudinal and behavioral factors					
Appointment health importance	100	1.00	5.00	3.8900	0.64971
Forgetfulness tendency	100	2.00	5.00	3.9700	0.62692
Preference for flexible timings	100	2.00	5.00	3.9500	0.65713
Valid n (listwise)	100				

Table 4: Suggested strategies for reducing missed appointments.

Descriptive statistics					
	N	**Min**	**Max**	**Mean**	**Std. Deviation**
Automated reminders effective	100	1.00	5.00	2.9100	1.32646
Online rescheduling option	100	1.00	5.00	3.2900	1.01797
Need patient education	100	1.00	5.00	2.9100	1.32646
Reduce opd waiting time	100	1.00	5.00	3.6100	0.86334
Dedicated reminder team	100				

Table 5: Cross-tabulation and chi-square test results for association between receiving an appointment reminder and attendance at the scheduled outpatient visit (n=100).

Items	**Categories**	**Receiving an appointment reminder**			**Test**	**Value**	**df**	**Asymptotic Significance (2-sided)**
		Yes	**No**	**Total**				
Sufficient reminders provided	Strongly Disagree	1	1	2	Pearson chi-square	2.323[a]	4	0.677
	Disagree	1	1	2	Likelihood ratio	2.169	4	0.705
	Neutral	13	3	16	Linear-by-linear association	.844	1	0.358
	Agree	50	17	67	N of valid cases	100		
	Strongly Agree	11	2	13				
	Total	76	24	100				
Reminder assists attendance	Strongly Disagree	2	2	4	Pearson chi-square	5.007[a]	4	0.287
	Disagree	0	1	1	Likelihood r Atio	4.489	4	0.344
	Neutral	9	3	12	Linear-by-linear association	2.510	1	0.113
	Agree	48	14	62	N of valid cases	100		
	Strongly Agree	17	4	21				
	Total	76	24	100				
Local language reminder	Strongly Disagree	0	0	0	Pearson chi-square	4.450[a]	3	0.217

Continued.

Items	Categories	Receiving an appointment reminder			Test	Value	df	Asymptotic Significance (2-sided)
preference	Disagree	4	3	7	Likelihood ratio	4.104	3	0.250
	Neutral	9	6	15	Linear-by-linear association	3.450	1	0.063
	Agree	54	13	67	N of valid cases	100		
	Strongly Agree	9	2	11				
	Total	76	24	100				
Automated reminders effective	Strongly Disagree	13	7	20	Pearson Chi-Square	2.628[a]	4	0.622
	Disagree	12	4	16	Likelihood Ratio	2.700	4	0.609
	Neutral	25	8	33	Linear-by-Linear Association	2.435	1	0.119
	Agree	12	3	15	N of Valid Cases	100		
	Strongly Agree	14	2	16				
	Total	76	24	100				

Table 6: Chi-square test results for association between work-related commitments and missed appointments (n=100).

Items	test	Value	df	Asymptotic significance (2-sided)
Work or job commitment	Pearson chi-square	12.632[a]	18	0.813
	Likelihood ratio	17.778	18	0.470
	Linear-by-linear association	1.356	1	0.244
	N of valid cases	100		
Inconvenient appointment time	Pearson chi-square	34.056[a]	24	0.084
	Likelihood ratio	41.276	24	0.016
	Linear-by-linear association	.276	1	0.599
	N of valid cases	100		

Table 7: Correlation and descriptive statistics of forgetfulness and rate of missed appointments (n=100).

Correlations			
		Forgetfulness	**Missed appointments**
Forgetfulness	Pearson Correlation	1	0.392
	Sig. (2-tailed)		0.000
	N	100	100
Missed Appointments	Pearson Correlation	0.392	1
	Sig. (2-tailed)	0.000	
	N	100	100
Correlation is significant at the 0.01 level (2-tailed).			
Descriptive Statistics			
	Mean	Std. Deviation	N
Forgetfulness	4.0500	0.64157	100
Missed Appointments	3.6700	0.39962	100

Table 8: Descriptive statistics and correlation between distance from the hospital and missed appointments (n=100).

Correlations			
		Distance from the hospital	**Missed appointments**
Distance from the hospital	Pearson Correlation	1	0.064
	Sig. (2-tailed)		0.525
	N	100	100
Missed appointments	Pearson Correlation	0.064	1
	Sig. (2-tailed)	0.525	
	N	100	100

Continued.

Correlations			
Descriptive statistics			
	Mean	Std. Deviation	N
Distance from the hospital	2.04	1.01424	100
Missed appointments	3.67	0.39962	100

DISCUSSION

Global evidence on missed appointments

Missed outpatient appointments are a widespread problem that reduces healthcare efficiency globally. Nonattendance rates range from 13% to 40% in some regions, with common causes including forgetfulness, work or family commitments, symptom improvement, illness, transport issues and financial barriers.[14] Both patient-related and healthcare system factors contribute to missed appointments.[24]

Healthcare system issues such as long waiting times, poor booking systems, unclear instructions and inadequate reminder systems further increase nonattendance.[15] Although SMS, phone calls and multimodal reminders improve attendance, they are most effective when combined with patient-centred scheduling and easy cancellation or rescheduling options.[16]

Missed appointments also create financial and operational burdens on healthcare systems. Younger adults, working individuals, socioeconomically disadvantaged groups and patients with previous missed appointments are more likely to miss appointments.[14,17] Studies suggest that combined strategies, including flexible scheduling, reminder systems, targeted follow-up and policy-level interventions, are more effective than reminders alone.[18]

National (Indian) studies on missed appointments

Research on missed outpatient appointments in India remains limited compared with high-income countries. Available studies report common causes such as forgetfulness, work commitments, transportation difficulties and poor communication systems.[19,30] Indian studies have also identified barriers like long travel distances, high transport costs, overcrowded OPDs and long waiting times between booking and consultation.[19]

Studies from Indian tertiary care hospitals suggest that reminder systems, easier rescheduling options and predictive models can improve appointment adherence.[19] Department-specific studies in dental, ophthalmology and general medicine clinics also report transportation issues, time constraints and forgetfulness as major reasons for nonattendance.[30] A 2024 mixed-method study on dental appointments in India reported missed appointment rates of 8–9% and highlighted poor awareness, financial limitations and transport barriers as key factors.[20]

The COVID-19 pandemic further reduced outpatient attendance due to fear of infection, travel restrictions and suspension of elective services.[21] However, Indian research remains limited by department-specific and retrospective designs, with few studies using behavioural frameworks or primary survey-based methods. Therefore, more comprehensive and theory-based studies are needed to identify effective strategies for reducing missed outpatient appointments in Indian tertiary care hospitals.[19]

Recommendations and future scope

The findings of this study have important implications for outpatient service management and healthcare delivery. Hospitals should strengthen automated and multilingual reminder systems through SMS, WhatsApp and voice calls. Improving hospital mobile applications for easier appointment cancellation and rescheduling may help patients with busy work schedules. Reducing waiting times and improving follow-up communication after missed visits may also improve appointment adherence and patient satisfaction. The study highlights the importance of patient-centred communication and regular patient engagement in reducing missed appointments and improving healthcare efficiency. The findings also support behavioural theories, particularly the Health Belief Model, in explaining appointment adherence. Future studies should include multiple hospitals and larger patient populations to improve generalizability. Longitudinal and mixed-method studies may provide better understanding of repeated non-attendance and the long-term impact of reminder systems. Future research may also explore artificial intelligence–based prediction models, digital health interventions and psychological factors such as motivation, health literacy and patient satisfaction. Comparative studies across public and private hospitals and urban and rural settings may further improve understanding of outpatient appointment adherence.

CONCLUSION

This study examined missed outpatient appointments in a tertiary care hospital and identified the influence of sociodemographic, behavioural and healthcare system–related factors on non-attendance. Analysis of 100 patients who missed scheduled appointments showed that behavioural and system-related barriers contributed more to non-attendance than demographic or geographic factors. Most respondents were working-age urban residents who commonly used digital platforms for appointment booking.

Although most participants received appointment reminders, no significant association was found between reminder receipt and attendance, suggesting that reminders alone may not ensure compliance. Forgetfulness emerged as the most significant determinant of missed appointments, while work commitments and distance from the hospital were not significantly associated with non-attendance. These findings indicate that behavioural factors, communication gaps and limited rescheduling flexibility play important roles in appointment adherence.

The study highlights the need for patient-centred strategies that combine effective digital reminders with behavioural interventions, flexible scheduling and improved communication systems to enhance outpatient attendance and healthcare efficiency.

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