Prevalence of Use and Exposure of Young Adults to

Electronic Cigarette and Hookah Advertisement and Marketing in South Africa

A National University Study

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Funder:

Campaign for Tobacco-Free Kids

Suggested citation:

Egbe, C.O., Gwambe, S. & Londani, M., (2024). Prevalence of Use and Exposure of Young Adults to Electronic Cigarette and Hookah Advertisement and Marketing in South Africa: A National University Study Report. South African Medical Research Council, Pretoria, South Africa

Acknowledgment:

The study team thanks all research assistants, and participants for participating in this study and ensuring its success. The funders are also appreciated for their kind support.

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List of Abbreviations

E-cigarettes	Electronic cigarettes
ENDS	Electronic Nicotine Delivery Systems
FCTC	Framework Convention for Tobacco Control
GATS	Global Adult Tobacco Survey
KAP	Knowledge, Attitude and Perceptions
KII	Key-Informant Interview
SAMRC	South African Medical Research Council
SASAS	South African Social Attitude Survey
WHO	World Health Organization

EXECUTIVE SUMMARY

Executive summary

Introduction: In recent years, tobacco and nicotine products like electronic cigarettes (e-cigarettes) and hookah (also known as hubbly bubbly, shisha or waterpipe), have become increasingly popular, especially among young adults globally and in South Africa. Concerningly, these products are often marketed as less harmful alternatives to conventional cigarettes and as trending products among their peers.

Aim: This study explored university students' exposure to the marketing of e-cigarettes and hookah in South Africa. Prevalence of use, as well as knowledge, attitudes, and perceptions (KAP) about e-cigarettes and hookah were also explored among this population.

Methods: An exploratory mixed methods research design was employed which involved the collection of data in two phases; qualitative (phase 1) and quantitative (phase 2). For phase 1, 10 university students (aged 18 -24yrs) who currently use e-cigarettes and/or hookah were purposively selected from each of the three purposively selected universities located in the three metro provinces in South Africa: Gauteng, Kwa-Zulu Natal and Western Cape (one university per province). These provinces and universities were selected because a 2021 South African study found that most vape shops were located around universities especially in these metro provinces. Key Informant Interviews (KII) were conducted by three research assistants recruited from each of these universities. The interviews were analyzed using thematic analysis with the aid of NVivo version 14 by four researchers at the South African Medical Research Council.

In phase 2, a cross-sectional web-based survey was conducted. The survey asked questions on use status, exposure to marketing, advertising, and promotions, and KAP about e-cigarette and hookah. The research instrument was piloted in a university not sampled to participate in the study. A total of 15 universities were sampled to take part

in the survey out of the 26 public universities. Sampling of universities was done by province. For three provinces, there was only one public university each, while for two provinces, there were only two public universities each. For these five provinces, all seven universities were included in the study. For the remaining four provinces, random sampling was conducted to select two universities each. Simple random sampling of two faculties/schools in the selected universities, followed by random sampling of two classes within the second and third years of study from each of the two sampled faculties/schools was conducted. Research assistants were recruited from each of the participating universities and supported by class representatives from each of the selected classes to conduct the survey. Once recruited, class representatives were tasked with posting the link to the survey daily until the numbers for that class had been reached.

The survey was hosted on RedCap and managed by the data manager. Analysis of survey data was conducted by a statistician using STATA version 17. Descriptive statistics were used to explore the quantitative data and inferential statistics like Chi-Square and Regression analyses were conducted to ascertain the relationship between exposure to marketing, advertisement, and promotion as well as KAP and the current use of e-cigarettes or hookah. All research assistants received training to conduct both the interviews and surveys in their respective universities.

A total of 30 interviews were conducted during phase 1, however one participant did not meet the inclusion criteria, therefore the interview was excluded. In phase 2, a total of 2946 undergraduate students participated in the survey. Participants who indicated that they were aged above 24 years were excluded from this analysis. A total of 2211 students were included in the analysis. Current use was defined as daily and non-daily use of the product.

Results: The prevalence of e-cigarette use and hookah smoking was 26.3% and 31.5%, respectively. Daily use prevalence of e-cigarette and hookah was 12.5% and 10.5%, respectively. Cigarettes smoking prevalence was 22.4%. About 20.0% of the students reported using both e-cigarettes and hookah, 15.9% reported using e-cigarettes and cigarettes, 16.8% reported smoking hookah and cigarettes and 13.9% reported using e-cigarettes, hookah and cigarettes (poly use). The majority of students were exposed to e-cigarette advertisement in stores where e-cigarettes are sold (58.7%), followed by stores where tobacco is sold (54.5%) and on the internet or social media (54.2%). About one-third of the students reported being exposed to e-cigarette promotional activities like sales/discounted prices (33.1%) and free samples of e-cigarettes (23.6%), among other promotional activities. Almost half of the students reported being exposed to hookah advertisement and marketing in stores where hookah is sold (48.3%) and on the internet and social media (47.3%). Exposure to hookah advertisement and marketing in bars/cafes/clubs/taverns and in restaurants where hookah can be rented was 43.4% and 43.1%, respectively. Only 17.2% of the students believed that e-cigarettes were less harmful than traditional cigarettes while most of the students have moderate to high knowledge about the harmfulness of hookah (61.6%). Information about the dangers of using e-cigarettes and hookah was mostly noticed on the internet or social media (66.3% and 54.6%, respectively).

Participants who reported being exposed to any e-cigarette advertisement, marketing and promotion had higher odds of currently using e-cigarettes compared to those not exposed, even after adjusting for socio-demographic factors (aOR 2.96; 95% CI: 1.35 – 6.48; p=<0.007), Also, students exposed to any hookah advertisement, marketing and promotion had higher odds of currently smoking hookah compared to those not exposed, even after adjusting for socio-demographic factors (aOR 3.12 95% CI: 1.81-5.38; p<0.001).

Conclusion: University students remain unprotected from the advertising and marketing tactics of the tobacco/nicotine industries in South Africa. The results of this study reveal a high prevalence of use of both e-cigarettes and hookah among university students and high exposure to various advertising and marketing tactics. This study adds to the already existing literature and evidence on the targeting of young people by the tobacco/nicotine industries, therefore strengthening the call for the appropriate regulatory measures to be put in place to protect young people from being targeted and recruited as the next generation of those addicted to nicotine.

INTRODUCTION

Introduction

In recent years, tobacco and nicotine products like electronic cigarettes (e-cigarettes) and hookah (also known as hubbly bubbly, shisha or waterpipe) have become increasingly popular, especially among young adults. More concerning is the fact that these products are often marketed as less harmful alternatives to conventional cigarettes without information about any health effects known or unknown that may be associated with the use of these products.[1]

E-cigarettes are devices powered by batteries that deliver nicotine via inhaled vapor, re-creating a similar sensation derived from smoking conventional cigarettes.[2] Hookah, on the other hand, is a smoking device that uses coals to heat tobacco on a device which enables the smoke to pass through a chamber of water (called the base or vase) before being smoked through a hose.[3] The tobacco is often sweetened or flavored with various fruity flavors such as honey, mint and coffee. Both e-cigarettes and hookah products are more socially acceptable among young adults due to their attractive designs, desirable flavors, increased palatability compared to conventional cigarettes, and the ability to be used discreetly or in a social setting (as for hookah).[4,5] Thus, hookah smoking is seen as a social activity among young people as it is usually done in groups, with the same mouthpiece passed from person to person.[6] There is increasing research suggesting that e-cigarette use and hookah smoking lead to nicotine addiction and increased risk of using combustible cigarettes among youth, and has been associated with several health risks similar to conventional cigarettes i.e. respiratory, heart and lung diseases.[7]

It has been well-established that the youth's curiosity in trying tobacco and nicotine products, including e-cigarettes and hookah has been largely influenced by the marketing and advertising tactics of the tobacco and nicotine industry.[8,9]The marketing of e-cigarettes in South Africa is largely unregulated. The South African tobacco control act of 1993 (amended 2008) does not cover the regulation of e-cigarettes. E-cigarette marketing is rife in South Africa and advertisement targets recruitment of a new generation of youth to get them addicted.[10] A 2021 South African study found that of the at least 240 vape shops in South Africa, 39% were located within a 10km radius of a university or college campus, and 65.3% were located within a 20km radius of a university or college campus.[11] A similar study also found that living near a vape shop was associated with a higher likelihood of currently using e-cigarettes.[2]

Hookah has become a popular and fashionable product among young people in South Africa. However, many young people do not know that hookah is a tobacco product and

that it is supposed to be regulated by the extant tobacco control policies in South Africa. Others believe that hookah is a less harmful tobacco product due to the fact that its smoke passes through water before being consumed when smoking.[12,13] Hookah bars are also popular around university campuses in South Africa and the paraphernalia for hookah smoking is sold in strategic locations in shopping malls around the country, much like e-cigarettes.[11]

It was therefore important to explore exposure of young South Africans (especially university students) to the marketing of e-cigarettes and hookah. Also, it is important to ascertain young individuals' perceptions of these two products.

Study objectives

The objectives of the study were to investigate university students' exposure to e-cigarette and hookah marketing and advertisement around university campuses and at other venues, as well as the relationship between exposure to marketing and current use of e-cigarettes and/or hookah. University students' KAP about the use of e-cigarettes and/or hookah was also explored. The prevalence of e-cigarette and hookah use, as well as dual use of these products was also explored.

Research questions:

The following research questions guided the study:

1. What is the prevalence of e-cigarette and hookah smoking among university students in South Africa?
2. What is the level of exposure to e-cigarette and hookah marketing and advertisement around university campuses and at other venues among university students?
3. What are university students' KAP of e-cigarette and hookah use?
4. What is the relationship between students' exposure to marketing and advertisement, KAP and use status of e-cigarettes and/or hookah?

Methodology

Research design

An exploratory mixed methods design was adopted for this study. This study design involved a first phase of qualitative data collection and analysis, followed by a second phase of quantitative data collection and analysis. The second phase is built on, and provides supportive information on the results of the first phase. Thus, results from the first phase (qualitative phase) were used to inform the review of a draft survey instrument that was used in the second phase (quantitative phase).

Population

For both the qualitative and quantitative phases, the target population was university students (undergraduates) in South Africa. Undergraduate students mostly fall within the 18 to 24 years age bracket which has been reported to have a higher rate of attendance at educational institutions.[14] There are 26 public universities in South Africa (Appendix 1). Three provinces; Northwest, Mpumalanga, and Northern Cape each has only one university while two provinces each has two universities; Free State and Limpopo.

Sample and sampling design

Sample and sampling for qualitative phase

Purposive and snowball sampling were used to recruit potential participants from the three selected universities (one from each of the three metro provinces; Gauteng, Kwa Zulu-Natal, and the Western Cape). Participants were required to be currently using e-cigarettes and/or hookah on a daily or non-daily basis. Five participants each who use e-cigarettes and/or hookah were recruited per university to attain a total of 10 participants per university and a grand total of 30 participants in this phase of the study.

Quantitative phase

Sample size determination

The standard sample size calculation for precision of proportion was used to calculate the sample size. To arrive at the sample size estimate, the following formula was used:

$$n = \frac{Z^2 P\,(1-P)}{MoE^2} * \frac{1}{(1-L)} * DEFF$$

Where n represents the required sample, **p** is the prevalence of exposure to advertising and marketing, **MoE** is the margin of error, **Z** is the critical value that corresponds to alpha, **L** is the non-response rate and **DEFF** is the design effect.

A prevalence of exposure to advertising and marketing of around 40% among young adults was assumed, based on results from the 2021 South African Global Adult Tobacco Survey. With 3% margin of error at 95% confidence level and design effect of 2.5, yielding a sample size of 2846 (Appendix 5). This included the expected response rate of 90% (based on a previous university study conducted in South Africa).[15] This sample size was rounded up to 3000. Power allocation was used to derive the sample size per province informed by

data from university students' enrollment in 2020 (for ages 18 to 24years) based on data obtained from the Department of Higher Education and Training's latest verified version of students' enrollment data in South Africa.

To guarantee adequate sample sizes in smaller substrata, a square root power allocation was used, which is given by:

$$n_p = \frac{\sqrt{N_p}}{\sum \sqrt{N_p}} * n$$

where n_p is stratum sample size (number of selected students aged 18 to 24years per province) and N_p is the population of university students aged 18 to 24years per province (2020 verified data obtained from DoHET).

Appendix 6 shows allocation of sample size according to university student size and province. Under proportional allocation, there was considerable variability in the sample sizes, where the expected sample size varied from 24 students in Northern Cape to 661 students in Western Cape (Appendix 6) hence not considered for this study. Under the power allocation, sample sizes have been adjusted and a minimum sample size of 99 and maximum of 631 students was obtained to minimize the variation within province (Appendix 6). Power allocation is a means to achieve a national spread that considers the student size of the strata (province).

Appendix 2 shows the selected universities and allocated sample size per province. Code names have been used to anonymize all participating universities. Two faculties, and two classes per faculty were randomly selected to participant in the study. Sample size for each selected university, each faculty and each class per university were determined by equal allocation of the determined sample size for that province (Appendix 2).

Sampling technique

Qualitative phase

As described under the previous section, purposive and snowball sampling were used to select 30 students who currently use e-cigarettes and/or hookah from three universities in the Gauteng, KwaZulu-Natal and Western Cape, provinces. One of the participants was excluded because it was later discovered that s/he did not meet the inclusion criteria by age. Eighteen (18) females and 11 males with ages ranging from 18 to 24 years were interviewed. The self-reported race groups of the participants included 26 Black students, one Coloured (mixed race) student, one Indian/Asian student and one White student.

Quantitative phase

A multi-stage cluster random sampling was used for this phase of the study. In the first stage, two universities were randomly selected from the four provinces with more than two universities. For the remaining five provinces (two each from Limpopo and Free State and one each from Mpumalanga, Northern Cape and North West provinces), all universities were included in the study. The total number of universities included in the study amounted to 15.

A simple random sampling of two faculties/schools in the selected universities was carried out in the second stage. This was followed by a random sampling of two classes within two years of study (i.e., years 2, and 3) making four clusters per university (Figure 1). Appendix 2 shows the sample size per cluster per university. Undergraduate students aged 18-24 years were eligible to participate in the study. Those that did not meet the age inclusion criteria were excluded from the study. Class representatives or class WhatsApp administrators were recruited as research assistants to work with university research assistants. Class reps posted the link to the survey daily on their class WhatsApp groups. All students who met the inclusion criteria, irrespective of their tobacco or e-cigarette use status, were eligible to participate in the second phase of the study.

Figure 2. Multistage cluster random sampling procedure

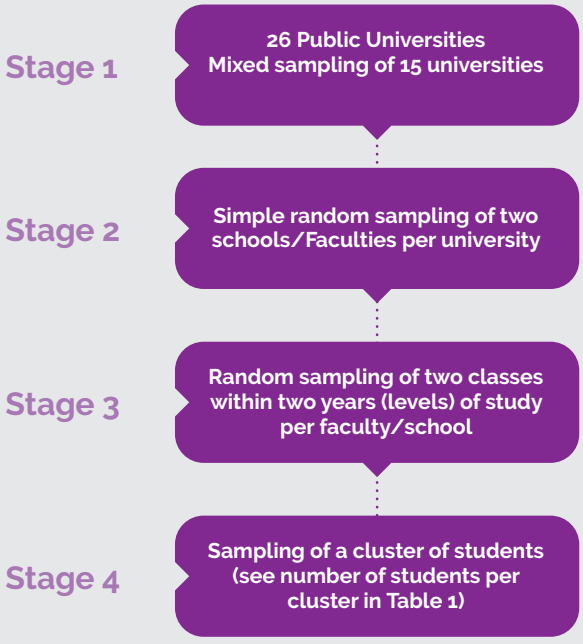


Figure 1. Multistage cluster sampling of survey participants

Inclusion criteria

The following inclusion criteria were applied in this study, the respondent must be:

- A registered student in one of the sampled universities, faculties/departments;
- Aged between 18-24 years;
- A consenting participant; and
- A student who currently uses either e-cigarettes or hookah (or both) – for phase 1 only.

Exclusion criteria

The following exclusion criteria were applied, a respondent was excluded if:

- The student was not registered in one of the sampled universities or faculties/departments;
- The person was younger than 18 years of age;
- The person was older than 24 years of age;
- Consent was not given; and
- A student who does not currently use either e-cigarettes or hookah (or both) – for phase 1 only.

Socio-demographic characteristics of the participants

Thirty participants from three universities took part in the first phase of the study. One of the participants was excluded because it was later discovered that s/he did not meet the inclusion criteria for age. Eighteen (18) females and 11 males with ages ranging from 18 to 24 years were interviewed. The self-reported race groups of the participants included 26 Black students, one Coloured (mixed race) student, one Indian/Asian student and one White student.

In the second phase of the study, a total number of 2946 participants from 15 universities in South Africa completed the web-based cross-sectional survey. However, 735 participants who indicated they were older than 24 years were excluded from the analysis, leaving a total of 2211 participants aged 18 to 24 years. Participants' distribution by sex showed 47.6% (n=656) were males while 52.3% (n=1555) were female. Other socio-demographic characteristics are presented in Table 1.

Table 1: Distribution of study participants (phases 1 and 2) by demographic characteristics

Demographic characteristics	Qualitative phase n (%) (N=29)	Survey phase n (%) (N=2211)
Sex		
Male	18 (62.1%)	656 (47.18%)
Female	11 (37.9%)	1555 (52.82%)
Age (years)		
18-20	9 (31.0%)	791 (52.77%)
21-22	12 (41.4%)	872 (27.97%)
23-24	8 (27.6%)	548 (19.26%)
Race		
BLACK	26 (89.7%)	2002 (84.18%)
COLOURED	1 (3.4%)	95 (5.59%)
INDIAN/ASIAN	1 (3.4%)	37 (2.84%)
WHITE	1 (3.4%)	77 (7.39%)
Socio-economic status		
Lowest	-	85 (2.10%)
Low	-	217 (5.86%)
Middle	-	480 (20.24%)
High	-	750 (36.87%)
Highest	-	679 (34.93%)

Research instruments

Interview guide

For the qualitative phase, an interview guide was developed to guide the Key Informant Interviews (KIIs). The interview schedule is based on a review of the relevant literature. For the quantitative phase, a questionnaire was designed using questions from the Global Adult Tobacco Survey, National Youth Tobacco Survey and findings from the qualitative phase. The survey instrument was pilot tested among 30 undergraduate students from one university which was not included in either of the two phases of the study.

Quantitative measures

E-cigarette, hookah, and tobacco use

E-cigarette, hookah and cigarette use was assessed by questions which asked respondents about daily and non-daily use (current use), former and never use. Cigarettes included factory-made and roll-your-own cigarettes.

Dual use and poly use

Dual use was defined as current use (daily and non-daily) of both e-cigarettes and hookah, cigarettes and e-cigarettes or cigarettes and hookah. Poly use was defined as current use (daily and non-daily) of cigarettes, e-cigarettes and hookah.

Advertising and marketing

Advertising and marketing for each product was assessed using two questions to determine if participants had noticed e-cigarette and/or hookah advertising within the last three months. Participants were first asked a composite question, to know if they had noticed any advertisements or signs promoting e-cigarettes and hookah within the last three months in 13 possible locations. Response options were "yes", "no", "not applicable" and "refused". Only options "yes" or "no" were included in the analysis. Responses to all questions in each category were combined to form one variable with Yes (response of "yes" to any question) and No (response of "no" to all questions). Participants were also asked "during the past 3 months, have you noticed any e-cigarette (hookah) adverts (e.g., in shops, shopping centers, TV, radio, billboards, newspapers, magazines etc.) in and around your university campus? Response options were "yes" and "no".

Promotions

Promotion for e-cigarettes and hookah was assessed using one composite question for each product which asked participants if they had noticed any type of e-cigarette and hookah promotions within the last three months. Participants were provided with eight possible promotional activities. Response options were "yes" and "no" "not applicable" "refused". Only options "yes" or "no" were included in the analysis. Responses to all questions in each category were combined to form one variable with Yes (response of "yes" to any question) and No (response of "no" to all questions).

Any exposure to advertisement, marketing and promotion

This variable was derived by merging the advertisement and marketing as well as promotion variables. A "yes", response to one or both of the variables was recoded as "yes". Response of "no" to both variables was recoded as "no"

Knowledge, attitudes, and perceptions

Level of knowledge about the harms caused by smoking hookah was derived from the question, "Based on what you know or believe, does smoking waterpipe/hookah/hubbly bubbly cause the following…" a) Stroke (blood clots in the brain that may cause paralysis)? b) Heart attack? c) Lung cancer? d) Diabetes? e) Lung disease? Responses include "yes", "no" "don't know" and "refused". Only responses "yes" and "no" were included in the analysis. A "yes", response to any of the variables was recoded as "yes". Response of "no" to all variables was recoded as "no". The KAP level ranged from 0-5, which was categorized as 0=No knowledge, 1-2=Low, 3=Moderate and 4-5=High knowledge.

Data collection

First phase: In this phase, qualitative data were collected through KIIs guided by the interview schedule. The participants were interviewed individually face-to-face by research assistants recruited from the selected universities. Participants were given informed consent sheets containing information about the study and consent forms which were signed as an indication of voluntary participation in the study. Participants were also required to complete a brief demographic questionnaire. Interviews were conducted in English and lasted for an average of 20-50 minutes. Each participant was compensated for their time with a R100 airtime or electricity voucher. All interviews were audio-recorded, and recorded interviews were transcribed verbatim. Where a participant spoke in vernacular at any point in the interview, these were also transcribed verbatim and then translated.

Second phase: Data were collected using REDCap, a web-based software platform developed to capture quantitative research data. One research assistant was recruited from each of the 15 selected universities. The link to the online survey was circulated on the selected class WhatsApp. Class representatives or class WhatsApp administrators were recruited as paid research assistants (4 per university) to assist each university's research assistant. These class representatives recruited participants by posting the link to the survey daily on their WhatsApp groups. Each participant was compensated for their time with a R50 airtime, electricity or cashsend voucher. Participation in the online survey was anonymous however, to prevent students from taking the survey twice, cellphone numbers entered to receive the vouchers were set up as unique identifiers. The survey was open for 3 months (April to June 2023).

Daily monitoring of data collected during the field work was conducted by the data manager and the research team. After the close of the survey, data collected using the REDCap platform were exported to excel and cleaned before being exported to STATA for analysis. All data were stored in SAMRC's secured cloud storage server and only accessed on the password-protected laptop computers by the data manager and principal investigator.

Data analysis

Thematic analysis of the qualitative data was conducted with the aid of the software NVivo version 14. Thematic analysis is a widely used method to analyse, identify and report patterns (themes) in qualitative data. This study followed the Braun and Clarke (2006) six-step framework for conducting thematic analysis. The analysis of the data involved reading

and re-reading the transcripts, the coding of the data was informed by the interview schedule and new themes which emerged from the interviews. Three research Assistants and the principal investigator (PI) initially coded a sample transcript, after which the research assistants completed the analysis. Afterwards the completed analysis was verified by the PI.

For the quantitative survey, data were exported to STATA for analysis. Respondents who were older than 24 years old and/or did not complete the survey, were excluded from the analysis. Non-response at province or university level are accounted for in the weighting formular.

Descriptive statistics and inferential statistics were conducted on the quantitative data. Descriptive statistical analysis was conducted to ascertain the prevalence of use of all products under investigation (e-cigarettes, hookah, cigarettes) as well as dual and poly product use. Students' KAP about these products as well as their exposure to marketing and advertisement of e-cigarettes and hookah were also investigated for various channels including in and around university campuses. Chi-square and logistic regression analyses were conducted to determine the relationship between exposure to marketing and advertisement as well as KAP and the current use of e-cigarettes and/or hookah. To determine the correlation between the items in the exposure and KAP index and level of knowledge scale, inter-item, correlation analysis was conducted. Items not contributing significantly to the index or scale were excluded.

Sample weights

To ensure that the data is representative of all South African university students aged 18 to 24 years, sample weights were applied. Weighting in this study was done in three steps. These included first calculating sampling probabilities separately for each sampling stage (base weights). The base weights were the inverse of the sampling probabilities in each sampling stage. In the second step, the base weights were adjusted for non-responses at the university level. Lastly, sample weights (base weight and non-response weight) were adjusted in such a way that the product of the weights match the population totals within the specified subgroups (for age, sex, and race) (latest university enrolment data obtained from DoHET). This type of adjustment is called post-stratification (by means of calibration), and it compensates for non-coverage of the target population.

Ethical consideration

Ethical approval for the study was obtained from the Human Research Ethics Committee of the South African Medical Research Council (SAMRC) in October 2022 (EC017-8/2022). Gatekeepers' permission/ethics approval were also obtained from all 19 universities included in this study (3 in phase 1, 1 pilot and 15 in phase 2).

For the qualitative phase of the study, participants were required to read an informed consent form and confirm their voluntary participation in the study with their signature. For the quantitative study, the link to the survey first directed potential participants to an information /informed consent page in which participants were asked to indicate their intention to voluntarily participate in the study by digitally signing the informed consent form by clicking "I agree" before proceeding to the questionnaire. In both phases, it was emphasized that participation is completely voluntary, and participants were informed of their right to withdraw from the study at any time without any repercussion. Participants' rights to privacy and confidentiality were maintained throughout the study. Unique identification numbers were assigned to each participant. All data were de-identified by using code names for key informants and participants' unique identification numbers for the survey. Data including audio recording and transcribed data are stored in a password protected laptop only accessible to the research team involved in this study. All forms of data would be stored for 15 years after the study has been concluded and destroyed afterwards.

Protection of Personal Information Act 4 of 2013 (as amended)

In compliance with the provisions of the Protection of Personal Information Act 4 of 2013 (as amended), participants were required to consent to their:

a. Personal information (hereinafter 'data') being collected, processed, shared and stored in accordance with the research protocol as approved by the South African Medical Research Council's Human Research Ethics Committee (SAMRC HREC)

b. Anonymized data being shared, processed, and transferred by third parties and between third parties, and where relevant beyond the jurisdictional borders of South Africa

c. To all findings and results flowing from their anonymized data being broadly shared and published on the conclusion of the research.

Findings

Findings from both the qualitative and quantitative phases of this study are presented to answer the research questions in 3 subsections according to the products investigated, namely e-cigarettes, hookah, tobacco use, dual and poly product use.

SECTION 1: ELECTRONIC CIGARETTES

Section 1: Electronic Cigarettes

Popularity and prevalence of e-cigarette use

Popularity of e-cigarette use among young adults

Qualitative results show that the use of e-cigarettes was popular within young adults' social groups and among their peers due to the perception of the product being cool and used as a tool to fit in or convey high social status. One participant described their initiation of e-cigarettes due to its popularity at school and it being easily accessible to them:

> *It was actually at school and most people at school did it ah so I remember I had just gone to the bathroom during the class and a few boys were vaping in the bathrooms and ah I asked one of the guys to just hit it from his vape and he agreed. So, from that moment it was ah just like an everyday thing really. So it's not like I have gotten out of my way to be looking for or like gone out of my way to look. (WC_02, Male)*

Furthermore, the social status attributed to those who use e-cigarette was of someone who is 'cool' and being seen as someone that is accommodative of others that might use e-cigarettes as well.

> *...it smells better, and makes me look cooler and relevant with the times that we are living in. (GP_10, Female)...uhm just for the enjoyment or fun just me being cool, me being also being accommodative to your social, or uhm closer circles that are in that particular moment... (WC_05, Male)*

Prevalence of e-cigarette use among young adults

Survey results show that overall, 74.3% of the students reported having ever heard of electronic cigarettes, 39.5% reported ever use, 26.3% reported current use, while 12.5% reported current daily use. A higher proportion of males than females reported ever use (43.4% versus 36.0%, respectively), current use (28.8% versus 24.1%, respectively) and daily use (15.4% versus 9.8%, respectively). The highest proportion of current use was found among those within the highest socio-economic status category (30.9%), those who identified as White (Caucasian) (53.1%) and those aged 23-24 years (36.3%) (Table 2).

Table 2: Electronic cigarette awareness and use by selected demographic characteristics

Demographic Characteristics	Ever heard of electronic cigarettes[1]		Ever use[1,2]		Current use[1,3]		Current daily use[1]	
	Percentage (95% CI)							
Overall	74.31	(70.17, 78.06)	39.49	(35.00, 44.16)	26.28	(22.35, 30.63)	12.45	(9.37, 16.36)
Sex								
Male	72.90	[65.40,79.29]	43.36	[35.93,51.10]	28.75	[22.18,36.37]	15.41	[10.10,22.81]
Female	75.58	[71.28,79.42]	36.03	[30.90,41.51]	24.06	[19.84,28.87]	9.80	[6.98,13.59]
Age (years)								
18-20	76.40	[69.51,82.12]	36.36	[29.53,43.79]	21.87	[16.38,28.58]	8.66	[4.71,15.36]
21-22	73.16	[66.96,78.56]	41.63	[35.18,48.38]	27.69	[21.77,34.51]	12.63	[8.62,18.14]
23-24	70.30	[63.00,76.69]	44.96	[36.76,53.44]	36.29	[28.13,45.33]	22.57	[15.24,32.08]
Race								
BLACK	72.14	[67.51,76.33]	35.41	[30.93,40.16]	23.12	[19.37,27.35]	8.88	[6.40,12.18]
COLOURED	68.10	[50.35,81.80]	49.68	[34.25,65.18]	40.88	[26.68,56.79]	22.52	[11.68,38.97]
INDIAN/ASIAN	94.24	[85.44,97.86]	38.70	[16.19,67.37]	21.33	[8.41,44.45]	14.66	[4.91,36.37]
WHITE	96.17	[88.10,98.84]	78.57	[62.46,88.98]	53.08	[32.22,72.92]	44.65	[24.14,67.16]
Socio-economic status								
Lowest	23.00	[11.52,40.67]	8.04	[1.375,35.42]	0.66	[0.20,2.12]	0.44	[0.11,1.82]
Low	59.38	[48.10,69.75]	31.35	[19.09,46.91]	18.89	[8.03,38.30]	4.91	[1.78,12.80]
Middle	81.40	[74.58,86.71]	36.46	[27.46,46.52]	27.49	[19.51,37.22]	16.46	[10.06,25.77]
High	72.03	[64.66,78.38]	40.94	[33.22,49.13]	23.90	[17.22,32.18]	10.49	[5.26,19.82]
Highest	78.22	[69.91,84.73]	42.97	[35.13,51.18]	30.87	[24.30,38.30]	14.18	[9.89,19.91]

[1] Among all students.
[2] Ever use = current use + past use
[3] Current use includes daily or less than daily use

Advertising and marketing of e-cigarettes

Participants in the first phase were asked what type of advertising they noticed within and around their university environment. E-cigarette and hookah advertising and marketing were reportedly noticed at a shop located within the student center on campus, on social media, radio commercials, on billboards, series on television and streaming platforms, student residences and leisure areas, posters and shopping malls.

> *"It's in the Student Centre on campus what I can say about the shop, it's a shop...basically it's for entertainment I guess cause it's usually those vapes, hubbly, you know and all those small things you know" (GP_08, Female)*

The participants mentioned being exposed to advertising and marketing of e-cigarettes on posters within and outside of the university campus, billboards outside campus, on social media (i.e., product reviews), shopping malls, retail stores and shops within the university campus that sold e-cigarettes.

"I used to follow the, what is it called? Vuse, Vuse Department yes, they used to sell Vuse and other type of vapers also, yes, I used to follow them. It's called Vuse department, it was on Facebook. That's the only account I actually remember cause I don't follow them anymore but yes" (KZN_08, Female)

...poster a bit you know, with the, uhm... what's this word pictures of the vape and flavors, and yah! (GP_07, Female)

Results from the survey phase show that majority of the students noticed advertisement or signs promoting e-cigarettes in stores where tobacco products are sold (54.5%), in stores where e-cigarettes are sold (58.7%) and on the internet or social media (54.2%), while 46.7% noticed this in bars/cafes/clubs/taverns, 34.7% on posters, 29.3% on public walls, 22.7% on public transport or stations, 21.6% on billboards, 24.0% on television and 16.2% reported noticing this on radio (Tables 3 and 3 cont.).

Table 3: Noticing any advertisements or marketing of electronic cigarette by selected demographic characteristics

Demographic Characteristics	In stores where tobacco is sold[1]		In stores where electronic cigarettes are sold[1]		In bars/ cafes/ clubs/ taverns[1]		On television[1]		On the radio[1]		On billboards[1]	
	Percentage (95% CI)											
Overall	54,48	(49.69, 59.18)	58,74	(54.13, 63.20)	46,69	(41.95, 51.49)	23,98	(20.02, 28.45)	16,2	(13.19, 19.75)	21,56	(17.98, 25.64)
Sex												
Male	59.97	[52.27,67.2]	60.43	[52.73,67.66]	53.46	[45.72,61.03]	21.84	[16.67,28.08]	14.46	[10.66,19.31]	21.74	[16.22,28.5]
Female	49.58	[43.75,55.42]	57.23	[51.73,62.56]	40.64	[35.42,46.09]	25.89	[20.33,32.35]	17.77	[13.47,23.07]	21.4	[17.04,26.53]
Age (years)												
18-20	53.99	[46.17,61.62]	61.08	[53.64,68.04]	46	[38.36,53.82]	21.01	[15.15,28.38]	12.22	[8.271,17.69]	17.99	[12.86,24.58]
21-22	50.67	[44.08,57.25]	56.44	[49.9,62.77]	44.18	[37.76,50.8]	26.92	[21.02,33.75]	18.64	[13.81,24.67]	25.34	[19.93,31.64]
23-24	61.33	[53.52,68.6]	55.67	[47.51,63.53]	52.23	[44.11,60.23]	27.85	[20.72,36.32]	23.59	[17.07,31.65]	25.87	[18.91,34.31]
Race												
BLACK	52.72	[47.6,57.78]	57.96	[53.08,62.69]	45.57	[40.5,50.73]	24.14	[19.86,29]	16.72	[13.41,20.66]	21.14	[17.29,25.58]
COLOURED	52.73	[36.99,67.94]	44.13	[29.74,59.57]	48.41	[33.11,64]	17.72	[8.066,34.57]	15.53	[7.81,28.52]	24.58	[13.12,41.29]
INDIAN/A	90.17	[70.7,97.21]	87.53	[73.03,94.79]	41.2	[16.33,71.55]	22.56	[5.701,58.4]	23.82	[6.663,57.81]	25.31	[7.213,59.64]
WHITE	62.11	[37.38,81.82]	67.58	[40.6,86.41]	60.28	[36.39,80.1]	27.45	[13.1,48.71]	7.89	[2.645,21.28]	22.65	[11.04,40.87]
Socio-economic status												
Lowest	12.5	[6.516,22.64]	9.143	[4.143,18.98]	33.93	[21.15,49.59]	5.692	[2.029,14.96]	14.8	[6.167,31.46]	6.80	[2.539,16.98]
Low	40.9	[28.74,54.29]	39.92	[27.76,53.48]	37.22	[27.43,48.18]	22.66	[11.32,40.2]	9.60	[5.226,16.96]	11.65	[6.283,20.6]
Middle	53.9	[43.27,64.18]	57.72	[47.69,67.15]	50.16	[39.51,60.79]	22.29	[14.06,33.48]	24.61	[15.95,35.97]	13.01	[8.412,19.6]
High	50.63	[42.68,58.56]	54.57	[46.53,62.37]	44.47	[36.75,52.45]	23.9	[17.64,31.54]	11.18	[7.557,16.25]	23.47	[17.36,30.92]
Highest	63.68	[55.28,71.31]	69.88	[62.41,76.43]	49.38	[40.9,57.9]	26.36	[19.68,34.34]	17.83	[13.15,23.72]	27.05	[20.35,34.99]

[1] Among all students.

Table 3 (Cont.): Noticing any advertisements or marketing of electronic cigarette by selected demographic characteristics

Demographic Characteristics	On posters[1]	In newspapers or in magazines[1]	In cinemas[1]	On the internet or social- media[1]	On public transport or stations[1]	On public walls[1]	Advertisement & marketing in and around university campus
				Percentage (95% CI)			
Overall	34.70 (30.95, 38.70)	22.60 (19.45, 25.99)	14.90 (12.38, 17.83)	54.20 (50.11, 58.13)	22.70 (19.51, 26.17)	29.30 (25.84, 33.01)	41.60 [36.86,46.53]
Sex							
Male	39.77 [32.31,47.73]	20.64 [15.31,27.24]	11.56 [7.95,16.52]	55.87 [48.06,63.41]	22.80 [16.83,30.12]	29.96 [23.31,37.59]	42.70 [35.13,50.62]
Female	33.74 [28.36,39.56]	19.89 [15.7,24.86]	12.56 [9.68,16.14]	61.61 [55.73,67.17]	18.90 [15.12,23.36]	28.51 [23.9,33.61]	40.60 [34.83,46.73]
Age (years)							
18-20	37.42 [30.04,45.42]	15.44 [10.64,21.88]	5.811 [3.942,8.487]	60.85 [52.93,68.23]	16.40 [11.18,23.42]	26.35 [20.19,33.6]	43.40 [35.66,51.36]
21-22	35.79 [29.58,42.52]	23.83 [18.8,29.71]	15.68 [11.33,21.30]	55.94 [49.26,62.41]	24.07 [18.94,30.08]	34.83 [28.6,41.63]	36.00 [30.00,42.55]
23-24	35.45 [27.91,43.79]	28.21 [20.94,36.82]	24.06 [16.83,33.16]	57.89 [49.49,65.86]	27.77 [21.18,35.48]	28.80 [22.24,36.39]	45.00 [36.76,53.43]
Race							
BLACK	36.10 [31.13,41.4]	20.61 [16.86,24.94]	11.31 [8.929,14.22]	59.46 [54.36,64.35]	22.11 [18.07,26.75]	30.83 [26.33,35.73]	38.80 [33.69,44.13]
COLOURED	35.50 [22.12,51.61]	15.93 [8.099,28.96]	24.82 [12.69,42.85]	45.77 [31.10,61.22]	17.86 [9.31,31.53]	16.43 [8.395,29.67]	44.40 [29.48,60.36]
INDIAN/A	54.34 [24.41,81.43]	26.70 [8.127,60]	18.94 [3.97,56.9]	62.77 [29.33,87.26]	9.70 [3.34,25.05]	12.97 [4.46,32.25]	81.20 [53.81,94.13]
WHITE	36.01 [19.5,56.66]	16.89 [6.679,36.6]	8.70 [3.078,22.23]	61.08 [36.84,80.85]	11.55 [4.66,25.85]	26.42 [13.02,46.27]	56.50 [33.64,76.93]
Socio-economic status							
Lowest	13.47 [6.559,25.65]	12.17 [4.37,29.59]	5.06 [1.64,14.56]	48.58 [32.18,65.29]	27.03 [16.89,40.31]	14.92 [7.964,26.23]	15.70 [6.86,31.84]
Low	25.16 [13.45,42.12]	12.90 [7.379,21.58]	8.60 [4.332,16.34]	54.07 [42.47,65.25]	18.54 [11.48,28.55]	27.19 [15.35,43.47]	19.60 [12.94,28.57]
Middle	31.89 [21.77,44.06]	19.67 [13.31,28.09]	16.54 [10.38,25.33]	64.00 [54.44,72.56]	21.83 [13.70,32.94]	26.16 [17.58,37.05]	50.80 [40.23,61.33]
High	32.53 [25.69,40.20]	15.05 [11.14,20.03]	6.87 [4.53,10.27]	56.20 [48.1,63.98]	16.78 [11.98,23.01]	27.09 [21.04,34.12]	32.90 [26.14,40.50]
Highest	46.89 [38.48,55.49]	27.78 [20.51,36.45]	16.02 [11.46,21.95]	60.25 [51.25,68.6]	24.27 [17.80,32.17]	34.37 [26.96,42.63]	50.70 [42.17,59.20]

[1] Among all students.

E-cigarette promotions

Participants in the qualitative phase of this study mentioned noticing e-cigarette promotions in places such as social media platforms, and kiosks where consumers are allowed to taste the product for free.

> *Yes I've seen most of the shopping centers around, the malls have this like a small I would say it's a kiosk or something where they actually allow you to taste electronic cigarettes for free cause… (KZN_01, Male)*

> *…they'll just do these like competitions where you can win like a bunch of vapes and…they do this thing called like [clicks tongue] I don't know what it's called but it's like a building competition, where you build an object made out of vapes, so like the one I saw was this girl she had like 100s of them, this other person made a chair with them, like a big chair not a small chair, like a huge one [emphasis] one you can sit on. It was actually quite disturbing and that's when I saw that like its getting a bit much now… you know what I mean…so yeah! (WC_03, Female)*

Survey results reveal that 33.1% of the participants noticed e-cigarettes being on sale or at discounted prices, 23.5% noticed free samples of e-cigarettes and 20.2% noticed free gifts or special discount being offered on other products when buying e-cigarettes. About 18.2% of the participants reported seeing "Vaping competitions" while 19.3% saw where sellers offered product tasting (Table 4).

Table 4: Noticing electronic cigarette promotions by selected demographic characteristics

Demographic Characteristics	Free samples of electronic cigarettes[1]		Electronic cigarettes at sale / discounted prices[1]		Coupons for electronic cigarettes[1]		Free gifts or special discount offers on other products when buying electronic cigarettes[1]		Clothing or other items with an electronic cigarettes brand name or logo[1]		Electronic cigarettes promotions in the mail[1]		Vaping competition[1]		Product tasting from sellers[1]	
	Percentage (95% CI)															
Overall	23.55	(19.66, 27.93)	33.06	(28.78, 37.6)	18.62	(15.04, 22.82)	20.24	(16.55, 24.51)	17.63	(14.61, 21.12)	15.79	(12.75, 19.39)	18.21	(14.68, 22.37)	19.27	(15.97, 23.06)
Sex																
Male	29.59	[22.75,37.48]	33.75	[27.08,41.14	23.71	[17.33,31.54]	21.10	[15.25,28.44]	20.29	[15.18,26.6]	17.76	[12.56,24.52]	22.64	[16.38,30.42]	23.08	[17.32,30.05]
Female	18.15	[14.65,22.27]	32.43	[27.15,38.2]	14.07	[11.05,17.76]	19.48	[15.22,24.58]	15.25	[12.12,19.02]	14.03	[11.07,17.62]	14.26	[11.23,17.95]	15.87	[12.72,19.62]
Age (years)																
18-20	19.45	[14.03,26.32]	31.94	[25.30,39.40]	14.67	[9.76,21.45]	20.69	[14.83,28.10]	11.87	[8.54,16.29]	12.62	[8.42,18.49]	13.47	[8.79,20.1]	15.55	[10.96,21.59]
21-22	23.53	[17.87,30.33]	33.36	[27.42,39.88	18.39	[13.53,24.49]	18.27	[13.89,23.65]	22.19	[16.70,28.86]	17.88	[13.41,23.44]	17.66	[12.7,24.01]	20.78	[16.05,26.48]
23-24	34.77	[26.58,43.98]	35.68	[27.95,44.23	29.78	[21.81,39.21]	21.89	[15.93,29.3]	26.79	[19.43,35.70]	21.44	[15.11,29.49]	32.01	[24.00,41.23]	27.28	[20.20,35.73]
Race																
BLACK	22.99	[18.80,27.79]	31.8	[27.23,36.75	17.6	[13.76,22.23]	19.78	[15.76,24.52]	16.29	[13.25,19.86]	15.15	[11.98,18.97]	17.78	[13.93,22.40]	18.91	[15.43,22.96]
COLOURED	34.59	[20.93,51.39]	37.29	[24.19,52.58	29.6	[16.96,46.40]	23.66	[13.67,37.76]	31.43	[18.10,48.73]	17.93	[9.191,32.04]	34.58	[20.87,51.44]	21.90	[11.37,38.02]
INDIAN/A	25.32	[7.56,58.41]	58.57	[26.87,84.46	39.22	[14.90,70.39]	41.21	[16.17,71.81]	28.03	[8.94,60.70]	36.46	[13.20,68.41]	19.71	[4.42,56.58]	27.02	[8.48,59.67]
WHITE	20.86	[9.28,40.45]	34.33	[18.39,54.8]	14.03	[5.85,29.99]	14.88	[6.27,31.37]	18.52	[7.71,38.20]	13.53	[4.55,33.95]	10.24	[4.19,22.94]	18.40	[7.36,39.01]
Socio-economic status																
Lowest	19.32	[7.54,41.31]	19.58	[7.74,41.39]	13.73	[3.82,38.94]	21.01	[8.68,42.66]	26.28	[11.74,48.84]	16.50	[5.67,39.37]	16.86	[5.77,40.16]	15.36	[4.88,39.13]
Low	19.17	[11.97,29.27]	20.11	[13.19,29.43]	10.76	[5.78,19.14]	12.46	[7.15,20.83]	16.39	[10.19,25.30]	8.77	[4.48,16.47]	18.40	[11.20,28.72]	10.65	[5.89,18.49]
Middle	26.31	[17.02,38.33]	29.27	[20.07,40.55]	21.64	[12.96,33.86]	19.85	[10.55,34.22]	17.14	[11.27,25.20]	10.40	[6.71,15.76]	20.03	[11.56,32.44]	12.56	[8.19,18.79]
High	19.09	[13.88,25.67]	31.55	[24.94,39.00]	10.74	[7.15,15.82]	15.88	[11.84,20.97]	11.91	[7.84,17.68]	11.39	[7.78,16.36]	12.61	[8.63,18.06]	16.45	[12.01,22.12]
Highest	27.63	[20.74,35.78]	39.82	[31.98,48.23]	26.80	[19.90,35.06]	26.33	[19.62,34.36]	23.65	[17.82,30.66]	24.69	[18.00,32.88]	23.12	[16.64,31.20]	27.81	[20.85,36.04]

[1] Among all students.

Knowledge, Attitudes and Perceptions (KAP) of e-cigarettes

Information about the health effects of e-cigarette use

The students' sources of information regarding the dangers of e-cigarettes consisted of various social interactions and contexts including interactions with friends, and social media. For some participants, their main source of information was 'word of mouth' from friends either in school or at social events, social media, including platforms like Instagram, also from reading articles online about the negative health effects of e-cigarettes. According to KZN_09

> *...well, I read, I read a lot of articles online, sometimes, well, not a lot, not that I do research, but then if I come across an article or story, or, you read, I read, so I have seen the effects of vape on people, stories we hear about people, it affects the lungs, articles about someone in hospital because of vape, someone in hospital because of cigarettes, someone in hospital because of weed. I've seen things, I've read the effect it has (KZN_09, Male)*

> *Okay, well I can say that, you will, when you get the pack of it, I can read the instruction and I can also be told by the person selling it for me whenever I buy it from him, the person selling it can like you know, brief you on the things that you buy or you know (KZN_08, Female)*

Survey results show that students noticed information of the dangers of using e-cigarettes on various platforms, 66.3% on the internet or on social media and 38.3% in newspapers or in magazines, 38.7% on television and 37.5% on radio. By sex, 71.8% of females and 60.2% of male students reported noticing information regarding the dangers of e-cigarettes on the internet or social media (Table 5).

Table 5: Noticing information about dangers of using electronic cigarette use by selected demographic characteristics

Demographic Characteristics	In newspapers or in magazines[1]	On television[1]	On the radio[1]	On billboards[1]	On the internet or social- media[1]
			Percentage (95% CI)		
Overall	38.32 (33.73, 43.13)	38.70 (34.09, 43.52)	37.53 (32.92, 42.38)	19.46 (16.43, 22.90)	66.34 (61.72, 79.67)
Sex					
Male	43.34 [35.63,51.38]	36.64 [29.50,44.43]	39.84 [32.26,47.94]	17.86 [13.58,23.13]	60.24 [52.26,67.72]
Female	33.84 [29.04,38.99]	40.54 [34.81,46.54]	35.46 [30.23,41.07]	20.90 [16.87,25.59]	71.79 [67.16,76.00]
Age (years)					
18-20	34.62 [27.51,42.49]	37.54 [30.24,45.45]	35.82 [28.57,43.79]	14.48 [10.73,19.24]	68.05 [60.39,74.84]
21-22	39.90 [33.38,46.80]	42.89 [36.30,49.73]	40.34 [33.76,47.29]	24.60 [19.08,31.11]	66.77 [60.62,72.40]
23-24	46.16 [38.04,54.48]	35.82 [28.34,44.06]	38.12 [30.37,46.52]	25.65 [19.25,33.31]	61.04 [52.52,68.94]
Race					
BLACK	39.84 [34.84,45.06]	41.29 [36.25,46.52]	41.38 [36.28,46.66]	20.96 [17.58,24.79]	69.01 [64.26,73.40]
COLOURED	36.70 [22.85,53.16]	29.60 [17.29,45.82]	30.89 [19.16,45.74]	10.90 [4.98,22.23]	45.39 [30.50,61.16]
INDIAN/A	11.32 [4.32,26.51]	12.69 [4.40,31.43]	11.82 [3.91,30.67]	27.26 [8.58,59.94]	60.74 [31.02,84.18]
WHITE	32.65 [16.65,54.06]	26.10 [11.98,47.82]	8.598 [3.12,21.55]	5.874 [1.881,16.88]	53.93 [31.96,74.48]
Socio-economic status					
Lowest	47.74 [31.37,64.61]	29.26 [14.33,50.55]	29.39 [15.63,48.34]	12.53 [6.287,23.42]	48.44 [31.95,65.27]
Low	30.48 [21.82,40.78]	32.52 [23.51,43.03]	32.50 [23.53,42.97]	15.76 [9.87,24.22]	68.91 [58.15,77.95]
Middle	52.85 [42.22,63.24]	44.69 [34.07,55.82]	53.86 [43.53,63.87]	21.77 [15.58,29.55]	63.90 [52.84,73.67]
High	32.38 [25.28,40.40]	34.82 [27.94,42.40]	29.39 [22.66,37.17]	17.00 [12.28,23.06]	62.15 [53.90,69.75]
Highest	36.92 [29.20,45.37]	40.94 [32.71,49.70]	37.99 [30.29,46.34]	21.76 [16.33,28.39]	72.83 [65.64,79.00]

[1] Among all students.

Perception about the harmfulness of E-cigarettes

Results from the qualitative phase revealed that university students had varied perceptions about the harmfulness of e-cigarettes. Their perceptions included that e-cigarettes contained nicotine and were harmful, but were safer than traditional cigarettes. However, some participants also believed that the health effects of e-cigarettes are still unfolding. According to a participant from a university in KwaZulu-Natal:

> *Many effects are still coming. Many issues are still going to be witnessed after of smoking this thing cause I feel like it's more, its bad than smoking the actual cigarettes. Okay, both are bad. Both cigarettes and electronic cigarettes are bad in my experience or in my perspective. (KZN_07, Male)*

About 17.0% believed that using electronic cigarettes was less harmful than traditional cigarettes, 30.8% believed that it was just as harmful and 44.9% believed it was more harmful (Table 6).

Table 6: Are the following products less harmful, more harmful, or just harmful as smoking 'regular' or 'conventional' cigarettes

	LESS HARMFUL	MORE HARMFUL	JUST AS HARMFUL	DON'T KNOW	Total
Smoking tobacco in a hookah (waterpipe/ hubbly bubbly)	14.58 (11.76-17.95)	45.40 (40.71-50.18)	34.49 (29.77-39.53)	5.53 (4.18-7.27)	100
Electronic cigarettes (e.g., Twisp, Evolution, Use, Smok, iJoy)?	17.23 (14.10-20.88)	44.85 (40.16-49.64)	30.84 (26.34-35.74)	7.09 (5.09-9.78)	100
Heated tobacco products (e.g., IQOS, Glo)	8.43 (6.41-11.01)	43.43 (38.85-48.12)	33.35 (28.56-38.53)	14.79 (11.86-18.30)	100
Smokeless tobacco such as snuff or chewing tobacco	24.39 (20.27-29.04)	25.92 (22.62-29.52)	33.37 (28.96-38.1)	16.32 (12.59-20.89)	100
Nicotine replacement therapy such as the patch, lozenge, or gum	29.86 (25.46-34.66)	32.89 (28.76-37.31)	21.58 (17.78-25.94)	15.67 (12.50-19.47)	100

Reasons for using e-cigarette

Qualitative results revealed that university students use e-cigarettes for various reasons namely, for enjoyment and looking cool, for the flavors and because of the ease of use (portability) of e-cigarettes.

> *Uhm just for the enjoyment or fun just me being cool, me being also being accommodative to your social, or uhm closer circles that are in that particular moment, otherwise non other reason for that (WC_05, Male)*

Other participants mentioned using e-cigarettes as an escape from reality, as a means to relax when overwhelmed by work or university, as an appetite suppressant, as a tool to quit smoking traditional cigarettes and as an alternative to smoking traditional cigarettes.

> *I got into the vaper (vape) to try cut down on the heavy smoking, so far smoking vaper (vape) has not been as bad compared to smoking cigarettes, I must admit that, withdrawing from cigarettes was very hard and painful, but vaper is good for me (GP_10, Female)*

From the quantitative results among students who currently use e-cigarettes, overall 31.2% reported using e-cigarettes for quitting smoking tobacco, 29.6% to avoid returning to smoking tobacco (among those who formerly smoked tobacco), 70.6% because they enjoyed using them, 20.8% because they are addicted, 38.7% because they can use them where smoking is not allowed, 40.8% because they are less harmful, 62.3% because they come in likeable flavors, 40.2% because a family or friend uses them, 43.7% to relieve stress, 50.2% because they were more portable and 34.5% because of peer pressure (Tables 7 and 7 cont.).

Table 7: Reasons for using electronic cigarettes among current those who currently use electronic cigarettes, by selected demographic characteristics

Demographic Characteristics	Reasons for Using Electronic Cigarettes[1]					
	Quit smoking tobacco[2]	Avoid returning to smoking tobacco[3]	Enjoy using	Addicted	Can use where smoking tobacco is not allowed	Less harmful than smoking tobacco
	Percentage (95% CI)					
Overall	31.15 (25.22,37.76)	29.56 (23.92,35.90)	70.60 (64.08,76.37)	20.84 (15.06,28.11)	38.71 (31.85,46.06)	40.75 (33.90,47.98)
Sex						
Male	32.75 [23.63,43.39]	30.18 [21.69,40.28]	71.94 [62.04,80.09]	23.17 [13.89,36.04]	44.03 [33.09,55.59]	42.58 [31.81,54.10]
Female	29.43 [22.52,37.42]	28.89 [22.09,36.80]	69.16 [60.47,76.68]	18.35 [13.08,25.12]	33.01 [25.89,41.01]	38.79 [31.06,47.13]
Age (years)						
18-20	17.58 [11.74,25.49]	17.85 [11.89,25.93]	66.57 [55.55,76.04]	16.92 [8.18,31.75]	29.78 [19.63,42.4]	35.84 [25.3,47.95]
21-22	35.03 [25.23,46.27]	36.09 [26.48,46.96]	69.93 [59.75,78.47]	22.62 [15.20,32.30]	43.22 [32.58,54.53]	45.23 [34.74,56.17]
23-24	55.99 [42.25,68.88]	46.74 [33.23,60.76]	80.42 [69.22,88.24]	27.15 [17.37,39.78]	52.47 [38.48,66.08]	45.63 [32.41,59.50]
Race						
BLACK	33.63 [26.9,41.11]	31.28 [24.93,38.42]	71.04 [63.90,77.26]	14.86 [10.86,20.01]	37.09 [30.25,44.49]	39.11 [32.28,46.40]
COLOURED	41.08 [22.53,62.57]	38.1 [20.53,59.45]	75.21 [52.16,89.41]	24.11 [11.10,44.70]	53.37 [32.97,72.71]	54.02 [33.45,73.30]
INDIAN/A	37.66 [13.62,69.83]	35.66 [12.54,68.18]	23.69 [7.81,53.23]	33.79 [11.13,67.53]	32.95 [11.16,65.77]	30.99 [10.24,63.87]
WHITE	12.45 [4.64,29.36]	15.54 [5.95,34.88]	75.09 [51.92,89.37]	47.56 [23.04,73.31]	41.23 [17.60,69.75]	44.75 [20.64,71.60]
Socio-economic status						
Lowest	2.82 [0.19,30.24] 0		94.51 [61.85,99.46] 0		2.674 [.1839,29.06] 0	
Low	21.67 [8.31,45.77]	21.45 [8.156,45.64]	73.27 [48.82,88.73]	11.91 [3.08,36.49]	52.03 [24.13,78.72]	32.85 [13.59,60.35]
Middle	49.65 [35.44,63.92]	45.92 [31.94,60.58]	68.57 [54.95,79.60]	10.91 [4.58,23.83]	41.37 [27.71,56.50]	50.00 [35.80,64.21]
High	17.36 [10.58,27.17]	15.63 [9.856,23.88]	66.85 [54.16,77.49]	21.24 [10.50,38.27]	37.19 [24.77,51.57]	37.13 [24.77,51.44]
Highest	37.41 [28.25,47.57]	36.87 [27.68,47.13]	74.78 [64.95,82.59]	26.67 [19.08,35.94]	37.72 [28.74,47.62]	41.28 [31.84,51.40]

[1] Among those who currently use electronic cigarette.
[2] Among those who currently smoke tobacco.
[3] Among those who formally smoke tobacco.

Table 7 (Cont.): Reasons for using electronic cigarettes among those who currently use electronic cigarettes, by selected demographic characteristics

Demographic Characteristics	Reasons for Using Electronic Cigarettes[1]									
	Comes in likeable flavors		A friend or family member uses them		Stress reliever		More portable		Peer pressure	
	Percentage (95% CI)									
Overall	62.27	(55.19,68.86)	47.17	(40.13,54.32)	43.74	(36.72,51.02)	50.15	(43.07,57.22)	34.46	(28.38,41.08)
Sex										
Male	61.07	[49.99,71.12]	49.72	[38.67,60.80]	42.00	[31.14,53.70]	50.69	[39.61,61.71]	34.27	[24.93,45.01]
Female	63.56	[54.75,71.55]	44.43	[36.37,52.79]	45.60	[37.28,54.17]	49.56	[41.14,58.01]	34.66	[27.59,42.48]
Age (years)										
18-20	54.35	[42.97,65.29]	43.72	[32.74,55.35]	38.40	[27.45,50.66]	44.70	[33.65,56.30]	24.49	[17.47,33.19]
21-22	65.57	[54.93,74.84]	48.85	[38.14,59.66]	41.43	[31.23,52.42]	48.20	[37.64,58.93]	38.96	[28.88,50.08]
23-24	75.41	[61.88,85.28]	52.56	[38.55,66.18]	58.66	[44.45,71.55]	64.81	[49.54,77.55]	50.50	[36.73,64.19]
Race										
BLACK	63.95	[56.45,70.82]	48.46	[41.12,55.87]	39.54	[32.55,46.98]	51.46	[44.00,58.86]	40.60	[33.59,48.02]
COLOURED	81.38	[57.39,93.42]	51.48	[31.29,71.19]	69.40	[48.75,84.39]	60.48	[39.16,78.45]	19.43	[7.66,41.20]
INDIAN/A	32.65	[10.91,65.75]	24.21	[8.36,52.80]	34.17	[11.70,67.03]	27.86	[8.56,61.44]	27.72	[8.36,61.71]
WHITE	50.26	[25.44,74.95]	42.84	[18.85,70.75]	54.98	[29.9,77.76]	42.74	[18.94,70.45]	11.31	[4.44,25.92]
Socio-economic status										
Lowest	94.51	[61.85,99.46]	2.67	[0.18,29.06]	2.67	[0.18,29.06]	2.67	[0.18,29.06]	2.67	[0.18,29.06]
Low	77.52	[54.00,91.01]	56.16	[28.31,80.60]	36.46	[15.53,64.18]	34.74	[15.29,61.08]	71.19	[47.75,86.98]
Middle	68.05	[53.94,79.48]	47.50	[33.64,61.75]	41.05	[27.65,55.93]	52.41	[37.93,66.50]	31.07	[19.28,45.96]
High	56.28	[43.13,68.60]	43.11	[30.38,56.81]	42.37	[29.40,56.49]	52.41	[39.36,65.15]	25.87	[17.29,36.80]
Highest	63.23	[52.51,72.79]	50.50	[40.39,60.57]	47.79	[37.84,57.92]	49.17	[39.16,59.26]	40.64	[31.31,50.69]

[1] Among those who currently use electronic cigarette.

E-cigarette flavor of choice

Sweet and fruity flavours were the most common among participants in the qualitative phase due to their taste and smell which plays a role in e-cigarette initiation and continued use. Additionally, one participant mentioned how the flavour they used was so enjoyable to the point where they could finish one flavour packet a day. It is understood that this refers to the e-liquid or disposable vapes. Participants refer to the vapes as flavours.

> *I like blueberry, yes and it's so sweet, and you just enjoy smoking it a lot, I used to like, finish one flavor a day. (KZN_08, Female)*

> *…at some point people fall in love with some certain flavours and they understand the flavours to be connected to their own accords and they are like oh I love this flavour and then every time they are sitting down doing nothing, they are just pulling out flavour and smoke so that in itself is addictiveness as well. (WC_05, Male)*

Additionally, from the survey results, overall, the four most preferred flavours were: 41.4% fruit; 21.8% preferred menthol or mint and 11.8% tobacco and 13.3% chocolates, candy, desserts or other sweet flavours. A higher proportion of females than males preferred fruity (47.9% vs 35.5%), menthol or mint (22.7% vs 20.9%), and chocolate candy, desserts, or other sweet flavours (14.2% vs 12.5%). However, a higher proportion of males than females preferred tobacco flavour (16.7% vs 6.5%) (Table 8).

Table 8: Percentage distribution among those who currently use electronic cigarette, by primary flavor of the electronic cigarette currently used and selected demographic characteristics

Demographic Characteristics	Primary flavor of the electronic cigarette currently used[1]																Total
	Tobacco Flavor		Menthol or Mint		Clove or Spice		Fruit Flavor		Chocolate, Candy, Desserts, or Other sweets		An Alcoholic Drink (such as wine/cognac/ margarita/ other cocktails)		A Non-Alcoholic Drink (such as coffee/soda/ energy drinks/ other)		Some Other Flavor		No Flavor		
	Percentage (95% CI)																		
Overall	11.81	(6.92,19.42)	21.77	(13.89,32.42)	4.30	(1.74,10.24)	41.44	(32.97,50.45)	13.27	(8.16,20.85)	3.30	(1.49,7.15)	2.33	(0.86,6.14)	0.97	(0.25,3.71)	0.81	(0.19,3.37)	100
Sex																			
Male	16.71	[8.43,30.44]	20.91	[8.90,41.71]	4.86	[1.21,17.54]	35.47	[23.75,49.23]	12.45	[5.77,24.83]	4.25	[1.35,12.61]	3.509	[0.99,11.64]	1.84	[0.46,7.12]	0		100
Female	6.50	[3.12,13.03]	22.69	[15.87,31.36]	3.69	[1.39,9.44]	47.91	[37.62,58.39]	14.17	[7.67,24.69]	2.27	[1.15,4.41]	1.059	[0.49,2.25]	0.03	[0.00,0.18]	1.69	[0.40,6.86]	100
Age (years)																			
18-20	6.99	[3.01,15.40]	32.72	[17.96,51.93]	1.24	[0.57,2.69]	44.91	[30.65,60.06]	6.02	[2.57,13.49]	3.19	[0.94,10.27]	3.775	[0.96,13.68]	0		1.16	[0.16,7.93]	100
21-22	13.55	[4.55,34.02]	15.13	[8.51,25.46]	2.74	[0.69,10.27]	38.96	[26.41,53.17]	23.93	[12.51,40.89]	1.07	[0.44,2.62]	1.91	[0.84,4.27]	2.70	[0.52,12.78]	0		100
23-24	17.76	[7.99,34.96]	10.99	[5.851,19.7]	10.85	[3.19,31.03]	38.41	[24.18,54.95]	13.92	[5.08,32.84]	5.78	[1.66,18.24]	.45	[0.11,1.82]	0.74	[0.10,5.18]	1.09	[0.157.51]	100
Race																			
BLACK	15.92	[9.47,25.53]	16.51	[11.44,23.25]	4.61	[1.58,12.66]	41.50	[32.44,51.17]	14.6	[8.46,24.02]	2.53	[0.86,7.16]	2.79	[0.92,8.16]	0.45	[0.11,1.87]	1.10	[0.26,4.54]	100
COLOURED	0.49	[0.10,2.35]	25.39	[10.88,48.68]	0.60	[0.14,2.65]	46.98	[25.04,70.16]	23.95	[8.30,52.27]	1.25	[0.32,4.812]	1.34	[0.18,9.37]	0		0		100
INDIAN/A	0		1.955	[0.24,14.34]	4.11	[0.51,26.59]	28.32	[6.68,68.57]	10.92	[1.67,46.97]	17.8	[3.59,55.78]	7.08	[1.47,28.05]	29.81	[4.89,77.81]	0		100
WHITE	0.14	[0.02,1.12]	47.68	[17.10,80.10]	4.99	[0.76,26.50]	39.77	[15.28,70.74]	1.08	[0.25,4.62]	6.19	[1.05,29.11]	0.08	[0.01,0.62]	0.08	[0.01,0.62]	0		100
Socio-economic status																			
Lowest	34.53	[4.52,85.44]	32.74	[4.19,84.42]	0		32.74	[4.19,84.42]	0		0		0		0		0		100
Low	46.34	[9.92,87.13]	13.89	[3.77,39.93]	3.19	[0.46,18.90]	9.80	[2.62,30.55]	20.67	[4.34,59.95]	1.43	[.16,11.57]	0		4.67	[0.53,30.93]	0		100
Middle	2.42	[0.72,7.88]	17.89	[9.11,32.14]	12.13	[3.07,37.56]	35.88	[21.46,53.4]	14.90	[4.57,39.02]	7.52	[2.48,20.66]	6.87	[1.51,26.23]	0		2.39	[0.33,15.33]	100
High	4.18	[0.88,17.60]	28.90	[12.04,54.70]	2.06	[0.42,9.51]	42.03	[25.41,60.68]	14.77	[6.45,30.35]	3.95	[0.89,15.92]	1.27	[0.47,3.35]	1.91	[0.26,12.68]	0.92	[0.12,6.44]	100
Highest	19.03	[10.86,31.2]	18.97	[10.74,31.29]	2.14	[0.97,4.64]	47.15	[35.33,59.30]	10.50	[4.77,21.54]	0.80	[0.35,1.79]	1.07	[0.47,2.41]	0.35	[0.06,2.12]	0		100

[1] Among those who currently use electronic cigarette.

Any exposure to marketing, advertisement, and promotion of e-cigarettes

Survey results show that overall, 76.4% of the students reported being exposed to e-cigarette advertisement and marketing, 46.7% to e-cigarette promotions and 77.9% reported any exposure to advertisement, marketing, and promotion. By sex, 76.0% of male students and 79.5% of female students reported being exposed to any e-cigarette advertisement, marketing, and promotion. Among the age groups, a higher proportion of those between the ages of 18-20 years reported exposure to e-cigarette advertisement, marketing, and promotion (79.5%). Among the socio-economic status categories, a higher proportion of those within the middle-SES class reported any exposure to e-cigarette advertisement, marketing, and promotion (86.6%) (Table 9).

Table 9: Percentage distribution of any exposure to marketing, advertisement and promotion of e-cigarette, by selected demographic characteristics

Demographic Characteristics	Advertisement & Marketing		Promotions		Any exposure	
	Percentage (95% CI)					
Overall	76.40	[72.20,80.19]	46.70	[41.96,51.53]	77.85	[73.63,81.56]
Sex						
Male	74.60	[66.86,81.08]	50.10	[42.33,57.82]	76.02	[68.21,82.41]
Female	78.10	[73.81,81.77]	43.70	[38.05,49.53]	79.48	[75.32,83.09]
Age (years)						
18-20	78.40	[71.31,84.11]	46.00	[38.37,53.84]	79.46	[72.36,85.11]
21-22	72.30	[65.72,78.04]	44.10	[37.63,50.78]	74.99	[68.43,80.58]
23-24	77.10	[70.18,82.73]	52.40	[44.32,60.40]	77.57	[70.71,83.21]
Race						
BLACK	75.70	[71.39,79.46]	45.50	[40.37,50.65]	77.23	[73.01,80.96]
COLOURED	75.00	[57.02,87.2]	56.70	[40.55,71.47]	76.54	[58.11,88.47]
INDIAN/A	98.60	[95.17,99.58]	72.40	[32.12,93.58]	98.67	[95.24,99.64]
WHITE	77.90	[43.88,94.05]	43.60	[24.81,64.35]	77.86	[43.88,94.05]
Socio-economic status						
Lowest	54.40	[36.47,71.25]	34.60	[18.91,54.58]	74.30	[56.44,86.58]
Low	67.50	[56.64,76.68]	34.20	[24.61,45.32]	69.20	[58.61,78.10]
Middle	84.90	[79.30,89.24]	56.00	[45.92,65.62]	86.55	[81.11,90.60]
High	69.70	[61.30,76.97]	41.70	[34.27,49.54]	70.76	[62.30,78.00]
Highest	81.40	[74.39,86.89]	49.40	[40.95,57.95]	81.95	[74.90,87.36]

Association between Knowledge, Attitudes and Perceptions (KAP), exposure to marketing and advertisement and e-cigarette use

Logistic regression results revealed that current e-cigarette use was not associated with the perception that e-cigarettes are addictive and harmful. In the unadjusted models, those who noticed e-cigarette marketing and advertisements in and around their university campus were more than two times more likely to be currently using e-cigarette (OR 2.46; 95% CI: 1.55 – 3.89; P <0.001), those who noticed e-cigarette advertisement and marketing in other places were almost three times more likely to be currently using e-cigarette (OR 2.87; 95% CI: 1.19 – 6.94; P <0.019), those who noticed e-cigarette promotions were almost four times more likely to be currently using e-cigarette (OR 3.72; 95% CI: 2.21 – 6.26; P <0.001) and those exposed to any form of advertisement, marketing and promotion were almost three times more likely to be currently using e-cigarettes (OR 2.73; 95% CI: 1.10 – 6.78; P =0.03) compared to those not exposed. Results were similar and remained significant after adjusting for socio-demographic factors (Table 10).

Table 10: Logistic Regression by e-cigarette use and e-cigarette KAP, and exposure to advertisements, marketing, and promotion

	OR (95% CI)	p-value	AOR (95% CI)[1]	p-value
KAP[2]				
Non-use	(ref)		(ref)	
Current use	0.86 (0.23-3.25)	0.824	0.65 (0.15-2.88)	0.574
Exposure to advertisement & Marketing in and around university campus				
Non-use	(ref)		(ref)	
Current use	2.46 (1.55-3.89)	<0.001*	2.37 (1.52-3.70)	<0.001*
Exposure to Advertisement & Marketing in other places				
Non-use	(ref)		(ref)	
Current use	2.87 (1.19-6.94)	0.019*	3.06 (1.42-6.61)	0.004*
Exposure to Promotions				
Non-use	(ref)		(ref)	
Current use	3.72 (2.21-6.26)	<0.001*	3.96 (2.48-6.32)	<0.001*
Exposure to Advertisement & Marketing				
Non-use	(ref)		(ref)	
Current use	2.94 (1.14-7.58)	0.025*	3.16 (1.40-7.15)	0.006*
Any Exposure to Advertisement, Marketing & Promotion				
Non-use	(ref)		(ref)	
Current use	2.73 (1.10-6.78)	0.030*	2.96 (1.35-6.48)	0.007*

[1] Adjusted odds ratio (AOR) is controlled by sex, age, race, and socio-economic status.
[2] Do you think e-cigarette is addictive + do you think e-cigarette is harmful.
* Significant at p <.05

SECTION 2: HOOKAH

Section 2: Hookah

Popularity and prevalence of hookah smoking

Popularity of hookah smoking

Qualitative results revealed that hookah smoking is also quite popular among the young adults in universities. It was usually smoked during their social gathering with friends or family members. A participant also mentioned being exposed to smoking hookah as a norm in the community.

> *We smoke this thing like almost every day, we go to Shisha Bar, Shisha bar is a smoke shop it's here by Fordsburg, you get me?…actually in most cases we smoke on weekends like where we smoke excessively, weekends whenever we are watching soccer…(GP_01, Male)*

> *…I think I've seen it before from a distance because I used to play football in high school and most Coloured people used to bring those things in stadiums to when they came to watch us…(WC_04, Male)*

Prevalence of hookah smoking

Survey results show that overall, 47.2% of the students reported ever smoking hookah, 31.5% reported currently smoking, while 10.5% reported daily smoking (Table 11). Slightly higher proportion of males than females reported ever smoking (48.6% vs 45.9%, respectively), current smoking (32.1% vs 30.9%, respectively) and daily smoking (13.0% vs 8.3%, respectively).

Table 11: Hookah smoking status by selected demographic characteristics

Demographic Characteristics	Ever smoking[1,2]		Current smoking[1,3]		Current daily smoking[1]	
			Percentage (95% CI)			
Overall	47.17	(42.46, 51.94)	31.46	(27.34, 35.89)	10.51	(8.02, 13.67)
Sex						
Male	48.6	[40.94,56.32]	32.12	[25.65,39.35]	13.02	[8.66,19.11]
Female	45.9	[40.21,51.71]	30.87	[25.84,36.39]	8.27	[6.04,11.23]
Age (years)						
18-20	44.53	[37.14,52.18]	27.32	[21.4,34.16]	6.87	[4.09,11.32]
21-22	48.90	[42.32,55.52]	34.16	[27.85,41.1]	11.42	[7.73,16.56]
23-24	51.90	[43.76,59.94]	38.87	[30.86,47.53]	19.16	[12.29,28.63]
Race						
Black	47.72	[42.65,52.83]	31.96	[27.48,36.80]	9.54	[6.89,13.08]
Coloured	55.31	[39.38,70.22]	44.25	[29.39,60.20]	27.34	[15.54,43.49]
Indian/Asian	29.09	[11.09,57.42]	15.23	[5.38,36.20]	8.88	[3.15,22.58]
White	41.78	[23.50,62.63]	22.28	[10.18,42.04]	9.43	[3.65,22.26]
Socio-economic status						
Lowest	9.91	[2.30,33.91]	9.68	[2.17,34.09]	0.44	[0.11,1.82]
Low	46.58	[34.58,58.99]	35.40	[23.09,50.01]	5.50	[2.14,13.43]
Middle	53.14	[42.32,63.67]	35.56	[25.76,46.73]	15.56	[9.29,24.91]
High	46.24	[38.52,54.14]	29.53	[22.95,37.08]	7.21	[3.67,13.68]
Highest	47.05	[38.81,55.46]	31.76	[25.23,39.10]	12.52	[8.78,17.55]

[1] Among all students.
[2] Ever use = current use + past use
[3] Current use includes daily or less than daily use

Advertising and marketing of hookah

The primary channels of hookah advertising as mentioned by the interview participants were posters, social media platforms, shopping malls, and TV series. The majority of the platforms identified specifically target young people. A participant from Gauteng mentioned noticing hookah being advertised in stores that had glass window displays of hookah and allowed consumers to view all of the different products and hookah add-ons.

> *It's generally just like a big piece of glass as a window to the shop, like the hubbly and all the stuff in display and then yeah in stores it's normally all like everything is laid out like you see all of the different flavours, you can take how many you want, there's like different coals, you get different foils, different types of hookahs then there tends to be like other tobacco and cannabis products there (GP_04,Male)*

> *Hookah is literally advertised everywhere, everywhere, everywhere. So, your Instagram, your... Because I guess with uh, with the advancements in technology and the rise of online businesses and the fact that these platforms are also now trying to cater to those markets. You see these advertisements like everywhere, you see them everywhere, Instagram, TikTok, which is crazy, you know because these are Apps also with children (WC_09, Female)*

Furthermore, participants mentioned noticing the indirect advertising of hookah on traditional media platforms such as television and on streaming platforms.

> *"Yeah, it was a music video on channel O and then I've never seen a movie acted out with a hubbly, no I've never seen no. Oh yes, Blood and water, blood and water at those parties they host they, they are usually hubbly there if I recall correctly." (GP_06, Male)*

Survey results show that 48.3% of the university students noticed advertisements or promotional signs for hookah in stores where waterpipe/hookah was sold, 43.4% noticed them in bars/cafes/clubs/taverns and 43.1% noticed them in restaurants where hookah can be rented, 27.2% on posters, 47.3% on the internet or on social media, and 23.3% on public walls. A higher proportion of male than female students noticed any advertisement or signs in stores where waterpipe/hookah is sold (50.8% vs 46.0% respectively). The majority of students who identified as Indian/Asian and Coloured reported noticing advertisements or signs promoting hookah in stores where they are sold (61.8% vs 54.5% respectively) (Tables 12 and 12 cont.).

Table 12: Noticing any advertisements and marketing of hookah by selected demographic characteristics

Demographic Characteristics	In stores where waterpipe/ hookah is sold[1]		In bars/ cafes/ clubs/ taverns[1]		On restaurants where waterpipe/ hookah can be rented[1]		On television[1]		On the radio[1]		On billboards[1]	
	Percentage (95% CI)											
Overall	48.28	(43.50, 53.09)	43.37	(38.68, 48.17)	43.10	(38.31, 48.02)	17.11	(13.71, 21.16)	13.09	(10.34, 16.45)	12.16	(9.48, 15.48)
Sex												
Male	50.80	[43.05,58.52]	45.44	[37.77,53.33]	46.10	[38.38,54.00]	15.15	[10.59,21.21]	13.70	[9.76,18.88]	13.69	[9.30,19.69]
Female	46.03	[40.32,51.84]	41.51	[36.08,47.16]	40.42	[34.67,46.46]	18.87	[14.23,24.58]	12.55	[8.98,17.28]	10.80	[7.94,14.53]
Age (years)												
18-20	47.43	[39.71,55.27]	40.06	[32.65,47.95]	44.08	[36.34,52.12]	15.14	[10.04,22.17]	9.79	[6.34,14.82]	10.65	[6.78,16.35]
21-22	48.05	[41.48,54.69]	47.50	[40.96,54.13]	42.04	[35.54,48.82]	19.18	[14.31,25.21]	16.66	[11.56,23.42]	14.10	[9.79,19.89]
23-24	50.94	[42.79,59.04]	46.43	[38.35,54.69]	41.95	[33.96,50.39]	19.54	[14.01,26.58]	16.96	[11.66,24.01]	13.47	[9.56,18.63]
Race												
BLACK	48.45	[43.32,53.60]	46.01	[40.91,51.19]	44.40	[39.22,49.71]	17.15	[13.44,21.64]	13.89	[10.77,17.73]	12.88	[9.85,16.68]
COLOURED	54.50	[38.65,69.49]	38.42	[24.87,54.05]	47.25	[32.14,62.88]	24.62	[12.72,42.27]	12.50	[6.00,24.24]	11.83	[5.44,23.82]
INDIAN/A	61.81	[33.17,84.07]	27.34	[8.62,60.02]	36.68	[13.22,68.77]	20.46	[4.76,56.99]	5.36	[1.63,16.22]	0.57	[0.11,2.91]
WHITE	36.49	[19.87,57.10]	23.14	[11.61,40.83]	27.63	[13.56,48.18]	9.689	[3.56,23.78]	7.47	[2.507,20.23]	8.64	[3.13,21.65]
Socio-economic status												
Lowest	9.66	[4.64,19.05]	33.42	[19.32,51.26]	8.18	[3.12,19.76]	6.201	[2.41,15.05]	20.38	[9.83,37.54]	8.23	[3.38,18.70]
Low	38.83	[26.57,52.68]	41.56	[29.38,54.88]	30.91	[18.68,46.55]	10.46	[5.94,17.77]	10.02	[5.03,18.97]	14.51	[8.35,24.02]
Middle	51.29	[40.64,61.82]	44.00	[33.45,55.12]	43.15	[32.50,54.48]	20.01	[11.96,31.55]	19.91	[11.56,32.11]	10.71	[6.42,17.36]
High	46.10	[38.36,54.04]	37.90	[30.76,45.60]	38.98	[31.68,46.81]	13.73	[9.09,20.22]	8.384	[5.25,13.12]	8.11	[4.66,13.72]
Highest	52.75	[44.12,61.22]	49.67	[41.16,58.19]	51.57	[43.07,59.98]	20.78	[14.86,28.28]	14.19	[10.42,19.02]	17.12	[11.74,24.30]

[1] Among all students.

Table 12 (Cont.): Noticing any advertisements or marketing of hookah by selected demographic characteristics

Demographic Characteristics	On posters[1]		In newspapers or in magazines[1]		In cinemas[1]		On the internet or social- media[1]		On public transport or stations[1]		On public walls[1]		Advertisement & marketing in and around university campus	
	Percentage (95% CI)													
Overall	27.16	(22.75, 32.07)	18.03	(14.53, 22.16)	10.55	(8.32, 13.30)	47.25	(42.50, 52.06)	16.99	(13.66, 20.94)	23.25	(19.32, 27.71)	30.40	[26.04,35.06]
Sex														
Male	29.76	[22.82,37.78]	20.27	[14.57,27.47]	11.56	[7.84,16.71]	43.59	[36.13,51.36]	20.94	[14.96,28.52]	27.29	[20.47,35.37]	33.00	[25.85,41.01]
Female	24.84	[19.55,31.01]	16.04	[12.18,20.83]	9.65	[7.36,12.57]	50.53	[44.69,56.35]	13.47	[10.74,16.75]	19.64	[15.92,23.98]	28.00	[23.23,33.35]
Age (years)														
18-20	26.77	[19.75,35.18]	16.16	[10.83,23.4]	5.73	[3.95,8.26]	45.25	[37.61,53.12]	12.65	[8.07,19.28]	21.14	[15.11,28.76]	28.30	[21.60,36.16]
21-22	29.53	[23.53,36.32]	19.54	[14.82,25.31]	14.48	[9.81,20.85]	50.59	[43.99,57.16]	21.31	[16.14,27.60]	25.31	[19.70,31.87]	30.60	[24.95,36.79]
23-24	24.81	[18.47,32.47]	21	[15.24,28.22]	18.06	[11.98,26.29]	47.91	[39.89,56.04]	22.63	[16.16,30.73]	26.04	[19.71,33.54]	35.70	[27.74,44.50]
Race														
BLACK	30.57	[25.58,36.06]	19.25	[15.31,23.92]	10.49	[8.07,13.52]	50.93	[45.79,56.06]	18.36	[14.57,22.87]	24.39	[20.04,29.34]	29.30	[24.70,34.38]
COLOURED	15.66	[8.02,28.34]	20.12	[9.47,37.75]	20.14	[10.05,36.27]	41.64	[27.54,57.27]	18.68	[9.25,34.10]	28.53	[15.89,45.74]	30.60	[18.33,46.50]
INDIAN/A	4.43	[1.33,13.75]	6.55	[1.44,25.19]	4.27	[1.10,15.10]	35.18	[12.36,67.62]	5.54	[1.74,16.21]	6.48	[1.42,25.03]	65.60	[36.96,86.14]
WHITE	5.802	[1.84,16.87]	7.042	[2.35,19.29]	6.47	[2.03,18.77]	14.27	[6.67,27.92]	4.57	[1.27,15.14]	12.69	[4.05,33.36]	28.60	[14.42,48.72]
Socio-economic status														
Lowest	21.48	[9.309,42.16]	11.37	[5.20,23.10]	4.30	[1.24,13.81]	41.35	[27.15,57.16]	27.21	[17.03,40.51]	12.69	[6.42,23.53]	18.70	[8.84,35.40]
Low	18.75	[11.96,28.15]	14.23	[8.60,22.63]	10.99	[5.51,20.72]	55.67	[44.17,66.59]	8.94	[4.82,16.01]	16.00	[9.93,24.75]	21.10	[13.67,31.05]
Middle	33.52	[22.34,46.92]	24.17	[14.31,37.83]	14.91	[9.09,23.50]	49.8	[39.15,60.46]	24.49	[15.62,36.23]	24.74	[15.08,37.83]	40.40	[29.74,51.95]
High	19.95	[14.48,26.85]	9.83	[7.01,13.62]	5.79	[3.29,10.00]	43.58	[35.92,51.55]	9.2	[6.34,13.16]	20.39	[14.94,27.21]	22.50	[16.77,29.51]
Highest	32.84	[25.13,41.60]	24.17	[17.89,31.82]	13.36	[9.48,18.50]	48.61	[40.17,57.13]	21.62	[15.34,29.57]	27.25	[20.49,35.25]	35.10	[27.48,43.60]

[1] Among all students.

Hookah promotion

Interview participants reported noticing the promotion of hookah on social media platforms and when it was being promoted by an influencer or a celebrity. One participant recounted noticing a hookah challenge on social media where the public was influenced to join in on the challenge.

> *I can give you an example, Oscar Mbo was smoking a hookah without a pipe, right so smoking it from the actual opening. Then it became a challenge and people were actually doing that, so yeah. (WC_10, Male)*

> *The advertisement I won't lie yoh yoh! (laughs), those ones, they have been on to it, like people who smoke it they have this technique of creating words and alphabets, the one that was trending was the creating [creation] of "O's" when they took out the smoke, and the other is they do alphabets like L, K, you know how they do it, but you get intrigued and be like I also want create an O with my own smoke how can I do that, I also want to take the smoke out of my nose (GP_02,Female)*

Survey findings show that 24.8% of the participants had noticed the distribution of free samples, 26.7% special discount offers, 19.1% coupons and 19.8% free gifts or special discount offers on other products when buying hookah products. About 17.4% of the participants reported noticing clothing with product brand name or logo, 19.0% have noticed competitions and 17.9% have noticed product tasting by sellers (Tables 13 and 13 cont.)

Table 13: Noticing hookah promotions by selected demographic characteristics

Demographic Characteristics	Free samples of waterpipe/hookah tobacco products[1]		Waterpipe/hookah tobacco products at sale/discounted prices[1]		Coupons for waterpipe/ hookah tobacco products[1]		Free gifts or special discount offers on other products when buying waterpipe/hookah products[1]	
	Percentage (95% CI)							
Overall	24.78	(20.54, 29.57)	26.65	(22.59, 31.14)	19.01	(15.19, 23.53)	19.79	(16.04, 24.16)
Sex								
Male	28.96	[21.98,37.11]	26.89	[20.58,34.29]	23.66	[17.26,31.53]	23.67	[17.49,31.22]
Female	21.05	[16.41,26.58]	26.43	[21.48,32.06]	14.86	[10.92,19.9]	16.32	[12.27,21.37]
Age (years)								
18-20	21.34	[15.03,29.39]	25.68	[19.3,33.29]	16.04	[10.56,23.62]	17.07	[11.52,24.57]
21-22	23.57	[17.84,30.46]	26.49	[20.98,32.84]	18.68	[13.53,25.21]	20.96	[15.77,27.32]
23-24	35.96	[27.86,44.96]	29.53	[22.87,37.18]	27.63	[19.88,37.01]	25.51	[18.71,33.77]
Race								
BLACK	24.62	[19.99,29.93]	27.95	[23.44,32.95]	18.90	[14.70,23.95]	20.44	[16.28,25.34]
COLOURED	28.12	[16.5,43.66]	26.08	[15.22,40.93]	29.42	[16.73,46.36]	26.40	[14.50,43.15]
INDIAN/A	46.10	[18.39,76.45]	39.27	[14.92,70.46]	29.90	[8.99,64.80]	20.68	[4.90,56.88]
WHITE	15.87	[7.406,30.8]	7.382	[2.73,18.46]	8.312	[2.937,21.36]	7.05	[2.36,19.23]
Socio-economic status								
Lowest	16.62	[5.717,39.59]	20.77	[8.62,42.15]	19.32	[7.562,41.21]	19.54	[7.72,41.34]
Low	13.25	[7.716,21.81]	18.98	[12.2,28.3]	9.35	[4.943,16.97]	12.59	[7.29,20.86]
Middle	38.75	[27.36,51.51]	29.15	[18.93,42.02]	29.84	[19.20,43.22]	23.30	[13.56,37.05]
High	15.46	[11.17,21.01]	23.00	[17.52,29.59]	10.88	[7.265,15.98]	14.48	[10.42,19.78]
Highest	28.96	[21.77,37.38]	30.68	[23.63,38.77]	22.93	[16.40,31.10]	24.57	[17.90,32.75]

[1] Among all students.

Table 13 (Cont.): Noticing hookah promotions by selected demographic characteristics

Demographic Characteristics	Clothing or other items with a waterpipe/ hookah tobacco product brand name or logo[1]	Waterpipe/hookah tobacco product promotions in the mail[1]	Hookah competiton[1]	Product tasting from sellers[1]
		Percentage (95% CI)		
Overall	17.38 (13.97, 21.40)	15.44 (12.20, 19.35)	18.95 (15.08, 23.54)	17.92 (14.29, 22.24)
Sex				
Male	19.43 [13.97,26.37]	15.24 [10.41,21.76]	22.20 [15.76,30.33]	20.63 [14.65,28.23]
Female	15.54 [11.7,20.35]	15.63 [11.64,20.66]	16.05 [12.03,21.08]	15.50 [11.61,20.40]
Age (years)				
18-20	13.03 [8.394,19.69]	11.46 [7.021,18.15]	17.00 [11.15,25.05]	15.42 [10.02,23.01]
21-22	20.04 [14.75,26.64]	17.18 [12.56,23.05]	18.59 [13.54,24.97]	18.64 [13.66,24.91]
23-24	25.40 [18.61,33.64]	23.84 [17.14,32.14]	24.83 [18.06,33.11]	23.71 [17.40,31.44]
Race				
BLACK	17.29 [13.54,21.83]	15.79 [12.21,20.18]	19.67 [15.33,24.87]	19.45 [15.33,24.36]
COLOURED	27.42 [15.05,44.61]	22.8 [12.15,38.69]	15.35 [7.52,28.78]	22.98 [11.32,41.08]
INDIAN/A	7.07 [2.47,18.62]	19.00 [4.02,56.74]	23.97 [6.76,57.84]	4.15 [1.03,15.29]
WHITE	14.67 [6.56,29.62]	4.59 [1.472,13.41]	11.60 [4.80,25.46]	1.95 [0.77,4.83]
Socio-economic status				
Lowest	20.36 [8.36,41.74]	17.02 [6.03,39.59]	20.68 [8.614,41.9]	14.96 [4.64,38.87]
Low	13.05 [7.78,21.08]	9.73 [5.23,17.41]	18.93 [11.5,29.56]	13.64 [7.78,22.99]
Middle	26.56 [17.22,38.6]	18.35 [10.3,30.54]	31.7 [20.4,45.68]	23.78 [13.72,37.99]
High	9.27 [6.09,13.87]	9.53 [6.73,13.33]	9.16 [6.11,13.52]	13.04 [9.20,18.17]
Highest	21.16 [15.11,28.8]	20.87 [14.61,28.89]	21.79 [15.54,29.67]	20.57 [14.55,28.24]

[1] Among all students.

Knowledge, Attitudes and Perceptions of Hookah

Knowledge about the health effects of hookah smoking

Some of the participants held the belief that hookah use has health implications, with many basing their opinions on personal observations and information obtained from the packaging of hookah or their friends. Health effects mentioned included the addictiveness, headaches, respiratory issues, feeling dizzy and even fainting after having smoked hookah.

> *Um, I think it will definitely affect my lungs, I read somewhere that it can cause cancer, but yeah, uh, I can already feel when I smoked too much, then my chest will start paining. (WC_08, Male)*

> *"What I know is that it is very addictive and if you smoke it like almost every day just like I am, you're at a risk of having a heart disease, that's what I know" (KZN_03, Female).*

> *Well, I know that they do have, they do cause issues with your lungs because even when you purchase the flavour, on the box, it's written that it has tobacco and I've…I know that tobacco is not good for your health for your lungs, it causes lung cancer, so that's (KZN_04,Female)*

Another participant recalls how one of their peers describes hookah as cancer whenever they smoke it. According to GP_01

> *Yeah, we know that thing is dangerous, actually sometimes when we are saying "pass me the pipe" like I hate this one though, this one like that guy, this other guy you get me at res, he'll be like 'pass me the cancer there" (GP_01, Male)*

Those who smoke hookah also gave personal accounts of the health consequences they have experienced from smoking hookah. Such health effects include coughing, respiratory issues such as breathlessness, sinus issues, other health effects included experiencing a dry throat, addiction, dizziness and lung issues.

It was nice (laughs), I don't want to lie, it was nice but as the time goes, I had complications with my…I has [have] asthma because of it, yeah. I would cough and not stop after taking it, after using it (WC_07, Female)

I started, I decided to, okay right, I saw the effects it had, , when, it should be last year November. I was smoking it then like I was out of breath and everything like that then I was like okay you know what, it seems like I need to stop it, but I was huh maybe it not that case, it's not hubbly or anything like that, it's something else then I was like let me give it another shot. Huh the last time I smoked it, not the last time but in November when I smoked it, Um I became dizzy and then people told me that it's because I smoked it without eating (GP_06, Male).

Survey results show that overall, 40.3% of participants had a high level of knowledge that hookah can cause strokes, heart attack, lung cancer, diabetes, and lung disease while about 38.0% had no or low knowledge about these health effects (Table 14).

Table 14: Knowledge or belief that smoking hookah causes stroke, heart attack, lung cancer, diabetes and lung disease

	No Knowledge		Low Knowledge		Moderate Knowledge		High Knowledge		Total
				Percentage (95% CI)					
Overall	12.51	(9.90,15.69)	25.94	(22.10,30.2)	21.21	(16.84,26.35)	40.34	(35.87,44.98)	100
Sex									
Male	13.59	[9.55,18.97]	26.92	[20.54,34.42]	19.28	[12.98,27.67]	40.21	[33.06,47.81]	100
Female	11.55	[8.45,15.58]	25.07	[20.86,29.81]	22.93	[17.35,29.66]	40.45	[35.04,46.11]	100
Age (years)									
18-20	12.02	[8.35,17.01]	28.87	[22.56,36.12]	24.66	[17.57,33.46]	34.45	[27.67,41.92]	100
21-22	14.32	[9.98,20.12]	21.1	[16.81,26.13]	19.42	[14.43,25.62]	45.16	[38.67,51.82]	100
23-24	11.21	[6.68,18.22]	24.97	[18.62,32.63]	14.33	[8.69,22.72]	49.49	[41.37,57.64]	100
Race									
BLACK	11.39	[8.80,14.61]	26.11	[21.90,30.80]	21.03	[16.45,26.48]	41.48	[36.65,46.48]	100
COLOURED	14.14	[7.14,26.07]	34.25	[20.75,50.90]	14.56	[6.62,29.05]	37.05	[23.04,53.64]	100
INDIAN/A	25.29	[7.24,59.48]	32.67	[11.98,63.37]	1.818	[0.51,6.267]	40.22	[14.58,72.62]	100
WHITE	19.13	[7.68,40.25]	15.23	[7.17,29.48]	35.73	[16.13,61.64]	29.90	[15.38,50.02]	100
Socio-economic status									
Low	18.18	[11.99,26.61]	18.42	[12.82,25.75]	15.67	[7.26,30.60]	47.73	[38.12,57.51]	100
Middle	9.47	[5.59,15.6]	33.74	[24.44,44.49]	24.34	[15.60,35.90]	32.45	[23.38,43.07]	100
High	12.74	[9.49,16.88]	24.58	[20.12,29.67]	20.94	[15.70,27.36]	41.74	[36.26,47.44]	100

Information about the health effects of hookah smoking

Sources of information about the dangers of hookah smoking included friends, social media platforms such as Facebook, twitter (X), documentaries on tobacco awareness as well as the packaging of hookah products. According to GP_02:

…the only thing was people stories that they post on Facebook, this is what happened to me, I was smoking and then I went to the doctor, and they had this issue, on twitter, like that's where I saw those stories. I have never went (sic) on the internet to try to look at it okay this is what it does and all those things (GP_02, Female)

Overall, the majority of the participants (54.6%) reported noticing information about the dangers of smoking hookah on the internet or social media. About 35.4% noticed this in newspapers or in magazines, 30.0% on television, and 33.1% on the radio. Race breakdown of the proportion of students who noticed information about the dangers of hookah smoking on the internet or social media include Black (59.2%), Coloured (40.5%), Indian/Asian (34.0%) and White students (20.3%) (Table 15).

Table 15: Noticing information about dangers of smoking hookah by selected demographic characteristics

Demographic Characteristics	In newspapers or in magazines[1]	On television[1]	On the radio[1]	On billboards[1]	On the internet or social- media[1]	In bars/ cafes/ clubs/ taverns[1]	In restaurants where waterpipe/hookah can be rented[1]
	Percentage (95% CI)						
Overall	35.39 (30.94, 40.1)	29.90 (25.6, 34.58)	33.16 (28.56, 38.1)	17.67 (14.54, 21.3)	54.57 (49.68, 59.38)	21.55 (18.45,25.00)	18.82 (15.93, 22.10)
Sex							
Male	40.83 [33.23,48.89]	28.63 [22.16,36.11]	35.49 [28.02,43.75]	17.69 [12.84,23.88]	50.43 [42.67,58.18]	22.09 [17.15,27.98]	20.36 [15.60,26.12]
Female	30.53 [26.12,35.33]	31.04 [25.62,37.04]	31.08 [25.78,36.94]	17.65 [13.91,22.15]	58.27 [52.31,63.99]	21.06 [17.44,25.2]	17.45 [14.24,21.21]
Age (years)							
18-20	31.54 [24.74,39.24]	28.00 [21.26,35.89]	33.51 [26.15,41.78]	13.71 [9.49,19.41]	52.18 [44.28,59.98]	15.42 [11.87,19.78]	13.46 [10.22,17.53]
21-22	34.08 [28.03,40.69]	30.81 [24.93,37.38]	28.44 [22.76,34.9]	20.31 [15.22,26.58]	56.03 [49.29,62.56]	25.58 [20.39,31.57]	23.33 [18.21,29.38]
23-24	47.84 [39.68,56.11]	33.81 [26.64,41.8]	39.06 [31.07,47.69]	24.70 [18.32,32.43]	59.00 [50.84,66.68]	32.49 [24.82,41.22]	26.98 [19.84,35.57]
Race							
BLACK	37.62 [32.72,42.78]	32.51 [27.71,37.71]	36.62 [31.51,42.06]	18.96 [15.47,23.02]	59.21 [53.93,64.29]	21.16 [17.94,24.78]	19.34 [16.26,22.84]
COLOURED	35.79 [22.19,52.13]	18.57 [10.07,31.72]	19.13 [10.58,32.12]	14.55 [6.56,29.21]	40.52 [26.40,56.39]	34.19 [20.65,50.91]	15.30 [7.78,27.89]
INDIAN/A	23.49 [6.49,57.62]	18.16 [4.67,50.15]	20.95 [5.03,57.04]	17.00 [3.05,57.14]	34.00 [11.60,66.90]	23.85 [6.68,57.80]	29.13 [8.50,64.51]
WHITE	14.25 [6.25,29.29]	13.30 [5.89,27.34]	9.10 [3.34,22.44]	5.687 [1.67,17.60]	20.27 [9.82,37.23]	15.51 [6.73,31.83]	11.67 [4.48,27.13]
Socio-economic status							
Lowest	37.77 [22.94,55.31]	18.42 [7.05,40.20]	20.17 [8.21,41.66]	20.02 [8.20,41.23]	62.63 [44.19,78.01]	37.37 [24.30,52.59]	8.926 [4.01,18.70]
Low	31.77 [22.83,42.30]	27.08 [18.89,37.19]	24.36 [16.56,34.31]	10.42 [5.80,18.01]	57.52 [44.43,69.64]	24.43 [17.44,33.11]	13.63 [8.82,20.49]
Middle	52.94 [42.31,63.30]	38.83 [28.44,50.35]	52.40 [41.95,62.64]	19.02 [13.05,26.86]	67.81 [57.33,76.76]	21.89 [15.13,30.59]	17.31 [11.34,25.50]
High	27.73 [21.25,35.30]	24.97 [19.16,31.85]	24.32 [18.17,31.74]	13.96 [9.59,19.89]	45.27 [37.72,53.04]	15.04 [11.02,20.2]	15.95 [11.86,21.10]
Highest	33.77 [26.43,41.99]	31.10 [23.50,39.87]	33.62 [25.82,42.44]	21.89 [15.84,29.44]	55.74 [46.97,64.16]	26.78 [20.83,33.7]	24.21 [18.64,30.81]

[1] Among all students.

Perception about the harmfulness of hookah smoking

On their perception of the harmfulness of hookah smoking, university students also believed that because the smoke in hookah passes through water before being inhaled, it is less harmful than traditional cigarettes. A student from the Western Cape mentioned:

> *'I think definitely hookah is less harmful, also, there's water in it so I don't know I think because with maybe 80% of the system is dependent on water, it's not a as bad and also there is something that has been around for years, like I said, it's something that the Arabs have been using within their social spaces for quite some time so I think it's the safest and they are definitely studies about it being harmful compared to cigarettes so surely it's not as bad.' (WC_06, Female)*

However, results from the survey also revealed that only 14.6% of the students believed that smoking hookah was less harmful than traditional cigarettes while 34.5% believed that it was just as harmful, 45.4% believed it is more harmful (see Table 6 on page 34).

Hookah flavour of choice

With regards to students' preferred hookah flavour, they mentioned the difference in flavour choice among male and female students. Female students were said to prefer sweet flavours while males preferred minty flavors.

> *So as people we prefer different things like because like the girl, most girls they prefer something sweet and everything and most guys prefer something mint you get me, and some of the guys prefer something mixes and everything you get me (GP_01, Male)*

Only descriptive data were collected with regards to whether students preferred flavoured or unflavoured hookah. Findings show that overall, 78.0% of the student population preferred flavoured waterpipe/hookah, about 12.0% preferred both unflavored and flavoured while only 10.0% preferred unflavored hookah. A higher proportion of female students than males preferred flavoured hookah (85.2% vs 70.4% respectively) (Table 16).

Table 16: Percentage distribution of participants smoking of flavoured or unflavoured hookah, by selected demographic characteristics

Demographic Characteristics	Flavor of waterpipe/hookah[1]						Total
	FLAVORED		UNFLAVORED		BOTH		
	Percentage (95% CI)						
Overall	78.01	(71.29,83.52)	10.03	(6.122,16)	11.96	(8.038,17.44)	100
Sex							
Male	70.44	[58.91,79.84]	13.38	[6.611,25.22]	16.18	[9.486,26.22]	100
Female	85.23	[79.31,89.68]	6.827	[4.199,10.91]	7.943	[4.667,13.2]	100
Age (years)							
18-20	78.58	[68.01,86.35]	13.85	[7.213,24.96]	7.571	[4.148,13.42]	100
21-22	78.68	[66.2,87.43]	5.207	[2.49,10.57]	16.11	[8.079,29.57]	100
23-24	75.9	[61.17,86.29]	8.167	[2.677,22.33]	15.93	[7.747,29.96]	100
Race							
BLACK	78.6	[71,84.64]	10.52	[6.134,17.46]	10.88	[6.765,17.03]	100
COLOURED	67.9	[44.02,85.05]	6.972	[1.484,27.16]	25.13	[9.94,50.5]	100
INDIAN/A	71.11	[36.86,91.21]	10.61	[1.808,43.37]	18.27	[4.986,48.79]	100
WHITE	83.61	[59.81,94.59]	6.412	[1.042,30.82]	9.976	[2.487,32.5]	100
Socio-economic status							
Lowest	18.74	[1.833,74.02]	6.732	[.9989,34.05]	74.52	[21.51,96.9]	100
Low	58.09	[32.89,79.68]	19.5	[9.083,36.99]	22.41	[4.777,62.45]	100
Middle	72.28	[58.62,82.76]	18.13	[9.589,31.62]	9.586	[4.77,18.33]	100
High	82.1	[68.46,90.64]	7.715	[2.255,23.25]	10.19	[4.658,20.85]	100
Highest	82.14	[70.54,89.83]	5.022	[1.253,18.05]	12.84	[6.862,22.76]	100

[1] Among ever waterpipe/hookah use.

Any exposure to advertisement, marketing and promotion of hookah

Survey results indicate that overall, 68.9% of the students reported being exposed to any hookah advertisement and marketing, 39.6% to hookah promotions and 69.8% were exposed to any advertisement, marketing, and promotion of hookah. Higher proportions of any exposure to advertisement, marketing, and promotion of hookah were found among the following categories of students: females (71.3%) aged category 21-22 years (70.3%), Black Africans (71.9%) and middle SES (78.9%) (Table 17).

Table 17: Percentage distribution any exposure to marketing, advertisement and promotion of hookah, by selected demographic characteristics

Demographic Characteristics	Advertisement & Marketing		Promotions		Any exposure	
			Percentage	(95% CI)		
Overall	68.9	[64.36,73.06]	39.6	[34.92,44.37]	69.78	[65.26,73.94]
Sex						
Male	66.9	[58.99,73.87]	40.8	[33.35,48.67]	68.04	[60.14,75.02]
Female	70.7	[65.73,75.19]	38.4	[32.90,44.30]	71.33	[66.39,75.81]
Age (years)						
18-20	68.8	[61.36,75.45]	38.5	[31.13,46.36]	69.67	[62.18,76.24]
21-22	69.2	[62.67,75.02]	36.4	[30.11,43.09]	70.28	[63.75,76.07]
23-24	68.5	[60.70,75.38]	47.2	[39.02,55.47]	69.34	[61.54,76.17]
Race						
BLACK	70.9	[66.41,75.09]	40.2	[35.19,45.42]	71.86	[67.34,75.97]
COLOURED	68.9	[51.88,81.97]	46.7	[31.56,62.54]	71.07	[53.78,83.83]
INDIAN/A	70.1	[41.02,88.73]	66.5	[37.77,86.63]	70.06	[41.02,88.73]
WHITE	44.8	[25.69,65.64]	16.3	[7.73,31.24]	45.00	[25.81,65.82]
Socio-economic status						
Lowest	64.4	[45.61,79.53]	29.5	[15.62,48.53]	65.08	[46.19,80.18]
Low	65.1	[54.36,74.56]	30.0	[21.05,40.81]	66.81	[56.27,75.91]
Middle	77.7	[70.32,83.64]	53.3	[43.01,63.39]	78.85	[71.63,84.63]
High	61.3	[52.94,68.96]	32.4	[25.89,39.73]	62.11	[53.75,69.81]
Highest	72.7	[64.92,79.33]	41.3	[33.29,49.77]	73.39	[65.59,79.97]

Association between Knowledge, Attitudes and Perceptions (KAP), exposure to advertisement, marketing and promotion and hookah smoking

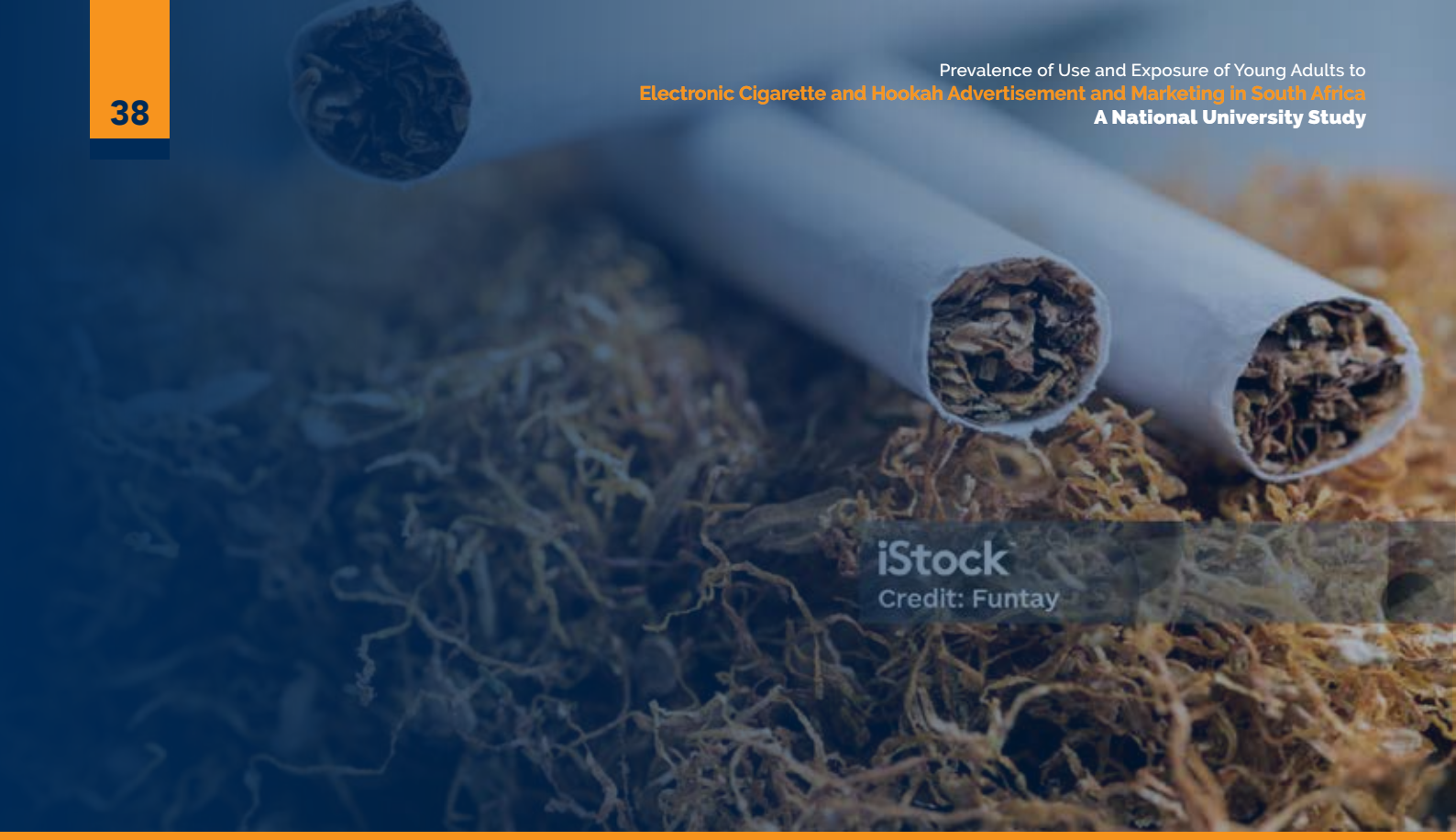
Logistic regression results indicate that KAP was significantly less associated with currently smoking hookah both in the unadjusted and adjusted models. Students who smoke hookah were 75% less likely to perceive hookah as addictive or harmful (aOR 0.25; 95% CI 0.07-0.91; p=0.037). Both in the unadjusted and adjusted models, current hookah smoking was not significantly associated with level of knowledge about the product.

However, exposure to advertisement, marketing and promotion was significantly associated with current smoking status both in the unadjusted and adjusted models. Students exposed to hookah advertisement and marketing including in and around university campuses were more than two times more likely to be currently smoking hookah compared to those not exposed (aOR 2.65; 95% CI 1.72 – 4.07; p<0.001) after adjusting for socio-demographic factors. Students exposed to any advertisement, marketing and promotion were three time more likely to be currently smoking hookah compared to those not exposed (aOR 3.14;95% CI 1.82-5.44;p<0.001) after adjusting for socio-demographic factors (Table 18).

Table 18: Logistic regression by hookah smoking, KAP, level of knowledge, advertisements, promotion and marketing

	OR (95% CI)	p-value	AOR (95% CI)[1]	p-value
KAP[2]				
Non-smoking	(ref)		(ref)	
Current smoking	0.25 (0.08-0.77)	0.016*	0.25 (0.07-0.91)	0.036*
Level of knowledge				
Non-smoking	(ref)		(ref)	
Current smoking	1.14 (0.77-1.69)	0.501	1.14 (0.77-1.68)	0.513
Exposure to advertisement & Marketing in and around university campus				
Non-smoking	(ref)		(ref)	
Current smoking	2.54 (1.64-3.96)	<0.001	2.65 (1.72-4.07)	<0.001*
Exposure to Advertisement & Marketing in other places				
Non-smoking	(ref)		(ref)	
Current smoking	3.00 (1.78-5.07)	0.019*	2.99 (1.77-5.04)	0.004*
Exposure to Promotions				
Non-smoking	(ref)		(ref)	
Current smoking	4.21 (2.74-6.48)	<0.001*	4.40 (2.92-6.64)	<0.001*
Exposure to Advertisement & Marketing				
Non-smoking	(ref)		(ref)	
Current smoking	2.85 (1.67-4.87)	<0.001*	2.84 (1.66-4.85)	<0.001*
Any Exposure to Advertisement, Marketing & Promotions				
Non-smoking	(ref)		(ref)	
Current smoking	3.14 (1.82-5.44)	<0.001*	3.12 (1.81-5.38)	<0.001*

[1] Adjusted odds ratio (AOR) is controlled by sex, age, race, and socio-economic status.
[2] KAP=do you think waterpipe/hookah is addictive + do you think waterpipe/hookah is harmful.
* Significant at p <.05



SECTION 3: TOBACCO, DUAL AND POLY PRODUCT USE

Section 3: Tobacco, dual and poly product use

Prevalence of tobacco smoking

This report on the prevalence of tobacco smoking is only based on survey data. Cigarettes were defined as manufactured cigarettes (MC) and/or roll-your own (RYO).

The prevalence of current cigarette smoking was 22.4% (26.5% male and 18.7% female). Of those who currently smoke, 13.5% smoked daily, while 8.8% smoked occasionally (Table 19).

Survey results also show that overall, 37.1% (40.0% males and 34.5% females) of university students reported currently smoking tobacco (cigarette and/or hookah) (Table 19).

Table 19: Percentage by detailed cigarette smoking status and sex

Smoking Status	Overall		Male		Female	
	Percentage (95% CI)		Percentage (95% CI)		Percentage (95% CI)	
Current tobacco smoking	37.08	(32.73, 41.66)	39.97	(32.88, 47.49)	34.50	(29.32, 40.08)
Current cigarette smoking	22.41	(18.77, 26.52)	26.51	(20.66, 33.33)	18.74	(14.47, 23.92)
Daily cigarette smoking	13.56	(10.87, 16.78)	17.44	(12.72, 23.43)	10.09	(10.87, 16.78)
Occasional cigarette smoking	8.85	(6.36, 12.19)	9.08	(5.80, 13.92)	8.65	(5.31, 13.79)
Occasional smoking, formerly daily	4.78	(3.27, 6.94)	5.56	(3.17, 9.58)	4.08	(2.49, 6.63)
Occasional smoking, never daily	4.07	(2.27, 7.20)	3.51	(1.65, 7.32)	4.57	(1.97, 10.22)
Non-smoking (cigarette)	77.59	(73.48, 81.23)	73.49	(66.67, 79.34)	81.26	(76.08, 85.53)
Non-smoking (tobacco)	62.06	(58.13, 65.83)	57.39	(51.09, 63.46)	66.30	(61.39, 70.88)

Note: Current tobacco smoking includes both daily and occasional (less than daily) smoking. Cigarettes = MC+RYO; Tobacco Smoking = Cigarette+hookah

Smoking frequency

Table 5 shows the frequency of tobacco smoking among university students aged 18 to 24 years. Overall, 16.5% reported daily smoking, 20.5% reported occasional smoking.

Among the age groups, the highest proportion of those reporting daily smoking was among the 23 – 24 years age group (Table 20). Among the racial groups, the highest proportion of daily smoking was among those who reported being of a mixed race (Coloured) (42.4%).

Table 20: Percentage distribution by tobacco smoking frequency and selected demographic characteristics

Demographic Characteristics	Tobacco Smoking Frequency						Total
	Daily		Occasional[1]		Non-smoking		
	Percentage (95% CI)						
Overall	16.54	(13.49, 20.12)	20.54	(17.15, 24.40)	62,92	(58.34, 67.27)	100
Sex							
Male	21.48	[16.04,28.15]	18.48	[13.78,24.34]	60.03	[52.51,67.12]	100
Female	12.12	[9.384,15.53]	22.38	[17.84,27.69]	65.5	[59.92,70.68]	100
Age (years)							
18-20	12.01	[8.367,16.95]	21.16	[15.92,27.57]	66.82	[59.66,73.29]	100
21-22	18.33	[13.31,24.71]	20.38	[15.4,26.47]	61.29	[54.43,67.72]	100
23-24	26.35	[18.85,35.52]	19.06	[13.78,25.77]	54.59	[46.2,62.73]	100
Race							
BLACK	15.21	[11.95,19.18]	21.43	[17.75,25.64]	63.35	[58.41,68.03]	100
COLOURED	42.41	[27.93,58.32]	17.44	[8.045,33.79]	40.15	[25.84,56.37]	100
INDIAN/A	10.99	[4.289,25.38]	6.791	[1.224,30]	82.22	[61.04,93.17]	100
WHITE	14.23	[6.438,28.58]	17.99	[6.828,39.64]	67.78	[47.11,83.24]	100
Socio-economic status							
Lowest	2.583	[.4912,12.47]	9.241	[1.931,34.5]	88.18	[65.84,96.65]	100
Low	15.05	[5.046,37.15]	24.37	[16.41,34.59]	60.58	[46.76,72.89]	100
Middle	17.98	[11.4,27.19]	23.47	[15.21,34.39]	58.55	[47.62,68.7]	100
High	13.94	[9.229,20.52]	19.62	[14.51,25.98]	66.44	[58.8,73.31]	100
Highest	19.54	[14.69,25.51]	19.86	[14.52,26.54]	60.61	[52.61,68.08]	100

[1] Occasional refers to less than daily smoking.

Dual and poly products use

Dual use was defined as the use of two products in three combinations: e-cigarettes and hookah or cigarettes and e-cigarettes or cigarettes and hookah. Poly use was defined as the use of all three products: cigarettes, e-cigarettes and hookah.

Dual use of e-cigarette and hookah

Overall, 19.9% of students reported dual use of e-cigarettes and hookah (20.8% males and 19.1% females). Students aged 23 to 24 years old had the highest proportion of dual use (29.4%). Within the socio-economic status, 22.9% of those within the middle-class wealth index reported dual use of e-cigarettes and hookah (the highest proportion among the socio-economic categories). Those who reported their race category as coloured also had the highest proportion of dual use among the race groups (26.4%) (Table 21).

Table 21: Percentage distribution by dual use (e-cigarette and hookah) frequency and selected demographic characteristics

Demographic Characteristics	Dual Use Frequency				Total
	Yes		No		
	Percentage (95% CI)				
Overall	19,92	(16.63, 23.68)	80,08	(76.32, 83.37)	100
Sex					
Male	20.81	[15.58,27.23]	79.19	[72.77,84.42]	100
Female	19.13	[15.3,23.67]	80.87	[76.33,84.7]	100
Age (years)					
18-20	15.27	[11.3,20.31]	84.73	[79.69,88.7]	100
21-22	22.18	[16.6,28.99]	77.82	[71.01,83.4]	100
23-24	29.40	[21.56,38.68]	70.6	[61.32,78.44]	100
Race					
BLACK	19.78	[16.24,23.87]	80.22	[76.13,83.76]	100
COLOURED	26.37	[15.03,42.04]	73.63	[57.96,84.97]	100
INDIAN/A	14.48	[4.958,35.45]	85.52	[64.55,95.04]	100
WHITE	18.8	[7.827,38.71]	81.2	[61.29,92.17]	100
Socio-economic status					
Low	14.01	[5.821,30.04]	85.99	[69.96,94.18]	100
Middle	22.89	[15.54,32.38]	77.11	[67.62,84.46]	100
High	19.74	[15.95,24.19]	80.26	[75.81,84.05]	100

Dual use of cigarettes and e-cigarettes

The quantitative results reveal that overall, 15.9% of students reported using both cigarettes and e-cigarettes (18.5% males and 13.6% females). Dual use of cigarettes and e-cigarettes was highest among those aged 23 to 24 years (26.4%) and those who reported their race group as coloured (29.5%) and those in the middle socio-economic status (18.2%) (Table 22).

Table 22: Percentage distribution by dual us (cigarette and e-cigarette) frequency and selected demographic characteristics

Demographic Characteristics	Dual Use Frequency				Total
	Yes		No		
	Percentage (95% CI)				
Overall	15.93	[12.95,19.45]	84.07	[80.55,87.05]	100
Sex					
Male	18.53	[13.50,24.89]	81.47	[75.11,86.50]	100
Female	13.62	[10.53,17.42]	86.38	[82.58,89.47]	100
Age (years)					
18-20	10.99	[7.741,15.37]	89.01	[84.63,92.26]	100
21-22	18.08	[12.84,24.86]	81.92	[75.14,87.16]	100
23-24	26.35	[18.71,35.75]	73.65	[64.25,81.29]	100
Race					
BLACK	14.44	[11.38,18.16]	85.56	[81.84,88.62]	100
COLOURED	29.49	[17.08,45.92]	70.51	[54.08,82.92]	100
INDIAN/A	15.25	[5.392,36.22]	84.75	[63.78,94.61]	100
WHITE	22.9	[10.37,43.27]	77.10	[56.73,89.63]	100
Socio-economic status					
Low	11.44	[3.871,29.28]	88.56	[70.72,96.13]	100
Middle	18.16	[11.43,27.61]	81.84	[72.39,88.57]	100
High	15.80	[12.44,19.87]	84.20	[80.13,87.56]	100

Dual use of cigarette and hookah

Overall, the prevalence of the dual use of cigarettes and hookah was 16.8% (18.7% males and 15.1% females). Students aged 23 to 24 years had the highest prevalence of dual use of cigarettes and hookah (25.2%). Furthermore, within the racial groups, coloureds had the highest proportion of dual use (25.7%) and Indians had the lowest proportion (15.2%). Those in the middle socio-economic class had the highest prevalence of dual use (22.3%) (Table 23).

Table 23: Percentage distribution by Dual use (cigarette and hookah) frequency and selected demographic characteristics

Demographic Characteristics	Dual Use Frequency				Total
	Yes		No		
	Percentage (95% CI)				
Overall	16.79	[13.52,20.65]	83.21	[79.35,86.48]	100
Sex					
Male	18.67	[13.71,24.90]	81.33	[75.10,86.29]	100
Female	15.1	[11.07,20.27]	84.9	[79.73,88.93]	100
Age (years)					
18-20	12.21	[8.123,17.95]	87.79	[82.05,91.88]	100
21-22	19.62	[14.23,26.41]	80.38	[73.59,85.77]	100
23-24	25.21	[17.78,34.44]	74.79	[65.56,82.22]	100
Race					
BLACK	15.8	[12.31,20.05]	84.2	[79.95,87.69]	100
COLOURED	25.69	[14.39,41.56]	74.31	[58.44,85.61]	100
INDIAN/A	15.23	[5.383,36.20]	84.77	[63.80,94.62]	100
WHITE	21.9	[9.895,41.72]	78.1	[58.28,90.11]	100
Socio-economic status					
Low	13.71	[5.438,30.49]	86.29	[69.51,94.56]	100
Middle	22.30	[13.41,34.71]	77.7	[65.29,86.59]	100
High	15.57	[12.30,19.53]	84.43	[80.47,87.70]	100

Poly products use

Overall, about 14.0% of the students reported using all three products (16.6% males and 11.6% females). In the age categories, the highest prevalence of poly use was found among those aged 23 to 24 years (23.4%) and the lowest among those aged 18 to 20 years (9.1%). Among the race categories, the highest prevalence was found among those who reported as Coloureds (20.8%) while the lowest prevalence was among those reporting as Black Africans (13.1%). The highest prevalence by socio-economic status was in the middle class (16.6%) (Table 24).

Table 24: Percentage distribution by poly products use frequency and selected demographic characteristics

Demographic Characteristics	Poly Users Frequency				Total
	Yes		No		
	Percentage (95% CI)				
Overall	13.97	[11.14,17.37]	86.03	[82.63,88.86]	100
Sex					
Male	16.59	[11.80,22.82]	83.41	[77.18,88.20]	100
Female	11.63	[8.777,15.26]	88.37	[84.74,91.22]	100
Age (years)					
18-20	9.112	[6.189,13.22]	90.89	[86.78,93.81]	100
21-22	16.61	[11.47,23.45]	83.39	[76.55,88.53]	100
23-24	23.44	[16.08,32.86]	76.56	[67.14,83.92]	100
Race					
BLACK	13.09	[10.13,16.74]	86.91	[83.26,89.87]	100
COLOURED	20.81	[10.61,36.79]	79.19	[63.21,89.39]	100
INDIAN/A	14.48	[4.958,35.45]	85.52	[64.55,95.04]	100
WHITE	18.68	[7.737,38.62]	81.32	[61.38,92.26]	100
Socio-economic status					
Low	11.44	[3.871,29.28]	88.56	[70.72,96.13]	100
Middle	16.55	[10.13,25.85]	83.45	[74.15,89.87]	100
High	13.53	[10.40,17.41]	86.47	[82.59,89.60]	100

Discussion

This study aimed to explore the exposure of e-cigarette and hookah marketing and advertisement among university students in South African universities. It also explored the students KAP about e-cigarettes and hookah. Findings from the study reveal that about 1 in 4 university students aged 18 to 24 years (about 26%) reported current use of e-cigarettes, while almost 40% reported ever use. Almost 1 in 3 students aged 18 to 24 years (about 32%) reported current hookah smoking, while about 47% reported ever use. The Global Adult Tobacco Survey (GATS) conducted in South Africa reported a prevalence of 2.2% for e-cigarettes and 3.1% for hookah use.[16] GATS-SA results, however showed that a higher proportion of 15 to 24 year olds reported current use of both products compared to other age categories (3.1% for e-cigarettes and 7.1% for hookah). This study therefore sheds more light on the use prevalence of e-cigarette and hookah among university students which previous studies in South Africa show as a group vulnerable to these marketing and advertisement tactics.[17] A study conducted by Kruger and colleagues in 2016 found that 63% of university students in the Western Cape reported ever use of hookah and 9.9% had smoked hookah in the past 30 days.[3] Hookah smoking has been increasing in prevalence nationally in South Africa and has become more popular among students than in 2016 as growing trends of using these products at parties and in students residences have been reported.[18,19] Prevalence results from our study is slightly higher than that found in China, which showed that 29.8% of university students in Guangzhou, China reported current use of e-cigarette.[20] Also, research into e-cigarette use has found that adolescents and young adults are more like to try these products than older adults.[21]

Findings from the survey revealed that the majority of university students were exposed to the advertising, promotion and marketing of e-cigarettes and hookah in and around university campuses and on the internet/social media. Exposure to advertising, promotion and marketing was also significantly associated with current use of both products. Dobbs and colleagues found that there was a significant relationship between the participants information sources and their knowledge about e-cigarettes and the messages they recalled.[22] In their study, Dobbs and colleagues found that participants received their information about e-cigarettes from social sources, media, advertising and education/ research and recalled either positive or negative information about e-cigarettes and hookah based on where or who they received their information from.[22] This highlights the importance of having health warning labels, including pictorial warnings, on these products to ensure consumers are given accurate information about the health effects of these products from a trusted source. The use of health warnings have been found to increase consumers awareness about the harms of tobacco products and encourages them to consider quitting.[23,24]

Social media platforms such as Tik Tok, Facebook and Instagram were mentioned as some of the platforms where participants noticed these advertisements, promotions and marketing. Taleb and colleagues conducted a study on the rise of waterpipe promotion on Instagram. The study found that 99.6% of posts explicitly or implicitly held positive sentiments about hookah use, 29.2% of the posts were made by a hookah bar/lounge and 27.6% were made by individual social media users.[25] Agaku and colleagues in their study on e-cigarette advertising exposure found that 20.1% of South African adults had been exposed to e-cigarette advertisements, with exposure most prevalent amongst those between the ages of 16-19 years old.[12] Furthermore, advertising on social media platforms often involved an influencer or a celebrity reviewing the product, informing the audience on how the product feels, looks and tastes. Qualitative findings from this study also show that celebrities using hookah and causing a trend was common in South Africa. A study conducted by Phua and colleagues found that celebrity endorsed e-cigarette brands on social media significantly increased positive attitudes towards e-cigarettes in comparison to non-celebrity sponsored brands.[26] Choi and colleagues investigated the motivations of social media use and the mediating and moderating mechanisms of their effects on attitudes toward e- cigarette use among adolescents. Their study found that exposure to e-cigarette messages on social media platforms such as Instagram and Snapchat was associated with positive attitudes toward e-cigarette use.[27]

The advertising and promotion of tobacco products such as hookah has been linked to the initiation of tobacco products, and evidence has also linked the initiation of e-cigarettes to its advertising and promotion.[12,28] A study investigating the advertising and promotion of e-cigarettes on social media in Indonesia found that participants who had reported ever seeing adverts and promotions of e-cigarettes were 2.91 times and 2.82 times more likely to ever use and currently use e-cigrettes.[29] The results of our study indicate that current e-cigarette use was about 4 times and 3 times more likely to be associated with exposure to e-cigarette promotions and advertising respectively after adjusting for demographic characteristics. Also, those who currently smoke were about 2.7, 4.4 and about 3 times more likely to have been exposed to hookah advertisements, promotions, and marketing respectively, after adjusting for demographic characteristics.

Conclusion and Recommendations

E-cigarettes are currently unregulated in South Africa, while hookah which is supposed to be regulated under the current Tobacco Product Control Act of 1993 (as amended in 2008) are largely not monitored for implementation. These regulatory loopholes for e-cigarettes increase the risk of exposure to advertising, promotion and marketing of these products especially among young people in South Africa. Also many of the advertisement and marketing tactics reported by participants using hookah are illegal under the current law. This study found that the hookah and e-cigarette prevalence appears to be driven by the popularity of these products among young people either due to its use by peers, friends, family or community culture which normalizes the use of these products. These factors all help to downplay the health risks associated with using e-ciagrettes and hookah. Lastly, young people do have some level of awareness about the health effects of hookah and e-cigarettes but most of them need the communication from trusted sources to educate them about the use of these products. The use of large pictoral health warnings have been found to be effective in communicating the health risks associated with using these products in other countries.[24,30]

The following recommendations are made based on the findings of the study.

Under the current Tobacco Products Control Act 83 of 1993 e-cigarettes are not regulated. Government needs to urgently pass the Tobaco Products and Electronic Delivery Systems Control Bill of 2022, which is now seeking to regulate e-cigarettes in order to protect young people from being targeted by the manufacturers and marketers of these products.

Graphic health warnings and plain packaging on the packaging of hookah and e-cigarettes should be considered as a measure that will educate and raise awareness about the health effects of using these products or being exposed to secondhand smoke. This measure will also de-glamorize these products thus making them less attractive to young people. In addition, graphic health warnings are able to communicate the health risks associated to a tobacco and nicotine product to those who use these products through images and they also ensure that every South African citizen irrespective of his/her literacy level is aware of the health risks.

A total ban on the advertising, promotion and sponsorship of hookah and e-cigarettes is required. One of the WHO FCTC's MPOWER measures is enforcing a ban on tobacco advertising, promotion and sponsorship, which can help countries reduce the demand for tobacco. While the Tobacco Product Control Act of 1993 (as amended in 2008) prohibits the advertisement of all forms of tobacco products (which includes hookah), the existence of advertisement and promotional activities for hookah speaks to the flouting of the law by marketers of hookah. The effectve implementation of current laws is therefore recommended.

Cessation and awareness programmes targeted at university students should be designed to provide information from credible sources about the harmfulness of using e-cigarettes and hookah.

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Appendix 1

Public universities in South Africa and number of selected universities by province

	University	Location	No. of Universities	No. of Selected Universities
Gauteng Province			**7**	**2**
1	University of South Africa (UNISA)	Pretoria		
2	University of Pretoria	Pretoria		
3	Tshwane University of Technology	Pretoria		
4	Sefako Makgatho Health Sciences University	Pretoria		
5	University of the Witwatersrand	Johannesburg		
6	University of Johannesburg	Johannesburg		
7	Vaal University of Technology	Johannesburg		
Northwest Province			**1**	**1**
8	North-West University	Northwest Province - Potchefstroom		
KwaZulu Natal Province			**4**	**2**
9	University of KwaZulu-Natal	KwaZulu Natal -Durban and Pietermaritzburg		
10	Durban University of Technology	KwaZulu Natal -Durban and Pietermaritzburg		
11	University of Zululand	KwaZulu Natal -Empangeni		
12	Mangosuthu University of Technology	KwaZulu Natal - Umlazi, Durban		
Free State Province			**2**	**2**
13	Central University of Technology	Free State- Bloemfontein		
14	University of the Free State	Free State - Bloemfontein		
Western Cape Province			**4**	**2**
15	Cape Peninsula University of Technology	Western Cape -Cape Town		
16	University of the Western Cape	Western Cape -Tygerberg, Cape Town		
17	University of Cape Town	Western Cape -Cape Town		
18	University of Stellenbosch	Western Cape - Stellenbosch		
Eastern Cape Province			**4**	**2**
19	Nelson Mandela Metropolitan University	Eastern Cape - Port Elizabeth and George		
20	Walter Sisulu University	Eastern Cape - East London and Mthatha		
21	University of Fort Hare	Eastern Cape Alice and East London		
22	Rhodes University	Eastern Cape - Grahamstown		
Limpopo Province			**2**	**2**
23	University of Limpopo	Limpopo - Turfloop and Pretoria		
24	University of Venda	Limpopo - Thohoyandou		
Mpumalanga Province			**1**	**1**
25	University of Mpumalanga	Mpumalanga - Mbombela		
Northern Cape Province			**1**	**1**
26	Sol Plaatje University	Northern Cape - Kimberley		
		TOTAL	26	15

Appendix 2

Appendix 2a: Sample size calculation

	critical value^2	p	1-p	MOE	MOE^2	Sample size	Adjusted sample size for clustering	Adjusted sample size for non-response
DEFF at 1.5	3.8416	20%	0.8	0.030	0.0009	683	1024	1138
	3.8416	30%	0.7	0.030	0.0009	896	1345	1494
	3.8416	40%	0.6	0.030	0.0009	1024	1537	1707
	3.8416	50%	0.5	0.030	0.0009	1067	1601	1779
DEFF at 2	3.8416	20%	0.8	0.030	0.0009	683	1366	1518
	3.8416	30%	0.7	0.030	0.0009	896	1793	1992
	3.8416	40%	0.6	0.030	0.0009	1024	2049	2277
	3.8416	50%	0.5	0.030	0.0009	1067	2134	2371
DEFF at 2.5	3.8416	20%	0.8	0.030	0.0009	683	1707	1897
	3.8416	30%	0.7	0.030	0.0009	896	2241	2490
	3.8416	40%	0.6	0.030	0.0009	1024	2561	2846
	3.8416	50%	0.5	0.030	0.0009	1067	2668	2964

Note: Highlighted row is sample size derivation for this study.

Appendix 2b: Power allocation of sample by province and sample by cluster per university

Allocation of sample size by stratum (province)				
Province	**Total (18-24 Years)**	**Probability Allocation**	**Sqrt (Total)**	**Power allocation***
Eastern Cape	13514	366	116	389
Free State	9982	270	100	335
Gauteng	35498	960	188	631
KwaZulu Natal	11945	323	109	366
Limpopo	4979	135	71	236
Mpumalanga	1060	29	33	109
Northern Cape	874	24	30	99
North-West	8588	232	93	310
Western Cape	24442	661	156	524
Grand Total	110882	3000	896	3000
Note: *used for this study				

Appendix 2c: Allotted sample size per study site

Province	sample size per province	University code	Power Allocation	sample size per faculty	sample size per class
Eastern Cape	389	EC1	195	97	49
		EC2	195	97	49
Free State	335	FS1	167	84	42
		FS2	167	84	42
Gauteng	631	GP1	316	158	79
		GP2	316	158	79
KwaZulu Natal	366	KZN1	183	92	46
		KZN2	183	92	46
Limpopo	236	LP1	118	59	30
		LP2	118	59	30
Mpumalanga	109	MP1	109	55	27
Northern Cape	99	NC1	99	50	25
North-West	310	NW1	310	155	78
Western Cape	524	WC1	262	131	65
		WC2	262	131	65
Total	3000		3000	1500	750

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