respondent have a family member who uses drugs, age at the onset of substance, and whether a respondent have criminally convicted, were significantly associated with the Overall substance involvement ($p < 0.05$. These variables were therefore involved in binary logistic regression to the determine directions of associations. However, Age group, marital status, education, biological parents, and housemates were not significantly related to the Overall substance involvement ($p > 0.05$). Table 4 shows binary logistic regression analysis of sociodemographic factors on overall substance involvement. Urban residents were 1.6 times more likely to have high Overall substance involvement score than rural dwellers (A*OR* = 1.6, $p = 0.04$, 95% *CI* = [1.013, 2.559]). Respondents whose parents do not live together were 2.747 times more likely to have Overall substance involvement score than those whose parents were separated (A*OR* = 2.7, $p = .004$, 95% *CI* = [1.370, 5.505]). Respondents with a history of previous rehabilitation program were 1.9 times higher odd of having high Overall substance involvement score than those who were following their first rehabilitation program (A*OR* = 1.9, $p = 0.017$, 95% *CI* = [1.133, 3.499]). Respondents with a family member who uses drugs were 1.7 more likely to have high Overall substance involvement score than those who had no family member who use drugs (A*OR* = 1.9, $p = 0.017$, 95% *CI* = [1.133, 3.499]). Finally, respondents who started using substances before exceeding 18 years of age had 2.25 higher odd of having high Overall substance involvement score than those who started later A*OR* = 2.25, $p = 0.001$, 95% *CI* = [1.377, 3.687]). However, the logistic regression analysis in this study showed that the relationship between the Overall substance involvement with religion and the history of criminal conviction were not significant.

Table 3: Logistic regression of sociodemographic factors and substance involvement

Variables	Odds Ratio	95 C.I.	*p*
Religion			
Christian	Ref.		
Muslim	1.550	[0.782, 3.072]	0.209
Resident			
Rural	Ref.		
Urban	1.610	[1.013, 2.559]	**0.044**
Parents live together			
Yes	Ref.		
No	2.747	[1.370, 5.505]	**0.004**
Previously admitted in a Rehab			
No	Ref.		
Yes	1.991	[1.133, 3.499]	**0.017**
Family member use drugs			
No	Ref.		
Yes	1.741	[1.116, 2.717]	**0.015**
Age of onset of substance			
Over 18 years	Ref.		
At age 18 years and below	2.253	[1.377, 3.687]	**0.001**
Ever been convicted			
No	Ref.		
Yes	1.450	[0.774, 2.715]	0.246

Socio-economic factors associated with substance involvement

Table 4: Socioeconomic factors associated with substance involvement

Variables	Overall substance involvement				χ^2	*p*
	Low		High			
	n	%	n	%		
Employment					**22.290**	**< 0.001**
Informal	42	32.1	89	67.9		
Formal	139	57.7	102	42.3		
Income (frw)					2.760	0.252
30000 and less	83	52.9	74	47.1		
31000 – 90000	67	47.9	73	52.1		
Above 90000	31	41.3	44	58.7		
Ubudehe status					**7.676**	**0.022**
Unknown	25	36.2	44	63.8		
First & second	96	48.2	103	51.8		
Third and fourth	60	57.7	44	42.3		

Table 5 shows socioeconomic factors associated with Overall substance involvement score. Employment status, and ubudehe status were found to be significantly associated with Overall substance involvement ($p < 0.05$). The respondent's income before being admitted in Iwawa Rehabilitation Center were not significantly related to the Overall substance involvement ($p > 0.05$). Ubudehe status and employment variables were therefore involved in the binary logistic regression analysis with Overall substance involvement. Table 4.6 represents binary logistic regression between socioeconomic factors and Overall substance involvement. Respondents who had informal employment before being admitted in Iwawa Rehabilitation center were 2.8 times more likely to have high overall substance involvement score than respondents who were formally employed (A*OR* = 2.8, $p < 0.001$, 95% *CI* = [1.786, 4.399]). Respondents who did not know their ubudehe status had 2.2 higher odds of having higher overall substance involvement score (A*OR* = 2.2, $p < 0.015$, 95% *CI* = [1.166, 4.230]. Being in the first and second ubudehe status were not significantly related to the overall substance ($p > 0.05$).

Table 5: Logistic regression of socioeconomic factors and substance involvement.

Variables	Odds Ratio	95 C.I.	*p*
Employment			
Formal	Ref.		
Informal	2.802	[1.786, 4.399]	**< 0.001**
Ubudehe status			
Third and fourth	Ref.		
First & second	1.405	[0.859, 2.298]	0.175
Unknown	2.221	[1.166, 4.230]	**0.015**

Discussion

This study has mainly investigated the factors associated with substance use among youth admitted at Iwawa Rehabilitation center. Tobacco products, cannabis, alcohol, and home-brewed drinks was found to be the most prevalent substances used by youth in the center. The important predictors of high substance involvement were urban resident, having parents who do not live together, having a family member who use drugs, early age at the onset of drug abuse, and informal employment. This section discusses the findings obtained in this study. This study found the prevalence of alcohol consumption to be 75.2% and that of cannabis to be 56.4% while 33.6% used tobacco products. This prevalence is significantly higher than the prevalence of alcohol (50.6%), tobacco (8%) cannabis (4.4%) use obtained in a nationwide study among general Rwandan youth (Habiyaremye et al., 2019; Kanyoni et al., 2015). Evidences show that increased alcohol, cannabis, and tobacco use among youth are interlinked with delinquency (Rocca et al., 2019; Tucker et al., 2019). Respondents in the present study are late delinquents and were likely to use substances mainly alcoholic beverages, tobacco products and cannabis which explain the higher rates obtained. The prevalence of inhalant usage was 2.9% while the prevalence of opioids was 5.6%. Only 6 respondents used Cocaine/ crack, sedatives were used by 2, amphetamine type stimulants were used by 2 and hallucinogens were used by only 3 respondents. Less than 0.5% had ever experienced sedative such as Diazepam or inhalants such as glue in a nationwide study among Rwandan youth (Kanyoni et al., 2015). Very low rate of cocaine, opioids and amphetamine type stimulants were also obtained among youths in Icyizere Rehabilitation Center, Kicukiro, Rwanda (Nzamwita, 2017). The unpopularity, and the high-cost of these drugs might be the cause of the low rate of abuse. Other type of drugs was used by 23.3% of the study respondents. They include illicit homemade substances with various psychological and psychological effects. According to the study respondents, they go with names such as ‘Imbutabuta’, ‘Ibikwangari’, or ‘Muriture’ etc. They also included homemade liquor called “Kanyanga”. In this study, urban residence was found to be an important determinant of high substance involvement. Similar results were found among Saudi College students (Alotaibi & Durgampudi, 2020), among college students in southeastern public university, US (Derefinko et al., 2018), and among Indian men (Balasubramani et al., 2021). Higher exposure, affordability, and easy access of these substances to the urban residents may contribute to the higher odd of usage in cities than in rural areas. This study found a significantly higher odd of having higher substance involvement among respondents whose parents do not live together. Similar results were found among Estonian adolescents (Tamson et al., 2021), French adolescents (Khlat et al., 2020), Finnish adolescents (Knaappila et al., 2020), and Nigerian youth (Oyewole et al., 2018) where having non-intact families were strongly associated with cannabis and tobacco use. People with substance use disorders at Icyizere Psychotherapeutic Center who were lived with only their mother had a higher odd of relapse than those were living with both parents (Kabisa et al., 2021). Youths who grow up in a non-intact family are likely to engage in substance consumption due to the premature independence and lack of parenting resources and/or lack of supervision. Findings of the present study showed that youth with family member who use drugs had higher odds of having higher substance involvement. Having a family member who consume alcohol were also strongly associated with alcohol initiation among youths in Puducherry, India (Lourde & Kodali, 2020) and in Lusaka, Zambia (Siwale & Siziya, 2019). Evidence also shows that the family history of alcohol use is the predictor of alcohol dependence (Mukherjee & Ghosh, 2022). Having a substance using family members was also a significant risk factors of tobacco and cannabis usage in other studies (Cambron et al., 2020; Dugas et al., 2019; Oyewole et al., 2018). Findings from a study among Mexican children suggests that maximum exploitation of parental influence during childhood may significantly reduce nonalcoholic substance usage (Vázquez et al., 2021). Parents who suffer from addiction show a limited or absent guidance of their children’s behaviors which contribute to the early substance abuse in children (Maina et al.,

2021). In the present study respondents who started using substances before exceeding 18 had higher odds of having high substance involvement than their counterparts. This finding is consistent with evidences that show that the early onset of drinking may results into severe level of alcohol dependence (Mukherjee & Ghosh, 2022; Yeung et al., 2022). Canadian youth who started to use cannabis before15 were at higher risk of developing drug abuse symptom at age 28 (Rioux et al., 2018). A systematic review of prospective longitudinal studies has also concluded that the at first intoxication at early age is a significant predictor of substance abuse disorders in adulthood (Morales et al., 2020). In this study all respondents with high substance involvement were using more than one substance. Evidences shows that people who use multiple substances have a greater chance of relapse (Andersson et al., 2019; Kabisa et al., 2021). This goes in line with findings of the present study where relapsed youth were more likely to have higher substance involvement than youth who were following their first rehabilitation programs. In addition to the sociodemographic factors, the relationship between socioeconomic factors were also assessed. A nationwide study among Rwandan youth found that employed individuals were 2.5 more likely to use tobacco (Habiyaremye et al., 2019). The present study found that respondents who were informally employed were 2.8 times more likely to have higher substance involvement. Day-to-day laborers are likely to frequent substance use permissive environment throughout the day. Contrastingly, tobacco and alcohol usage are usually prohibited in formal employment environment including banks, clinics, and public administration. Additionally, people with high substance involvement are not likely to stay at work for long time. There was no significant difference in substance involvement between respondents in the first and second ubudehe status compared to those in third and fourth. However, respondents who did not know their ubudehe status were more likely to have high overall substance involvement. Not knowing the ubudehe status may be attributed to the delinquency which in turn is usually associated with substance use. The fact that the present study included the late delinquent people may have caused the lack of significant difference in substance involvement based on biological parents status. In a study among general youth in Rwanda, people who had no alive parents were more likely to use substances than those with at least one alive parent (Kanyoni et al., 2015). Age, marital status, religion, education, income and the history of criminal conviction were also not associated with substance use in this study. Nevertheless, This study has identified the levels and risk factors of substance use among youth admitted in Iwawa Rehabilitation Center. It included youths from all Districts of Rwanda. It is therefore an important support to the prevention of substance abuse and related disorders in Rwanda.

Conclusion

Alcoholic beverages, cannabis, tobacco, home-brewed beverages, and opioids are the mostly used substances at high risk level by youth in Iwawa Rehabilitation Center. These substances are also responsible for daily drug related psychosocial and health problems faced by youth. Having parents who do not live together, having a family member who use drug, early age at the onset of substance abuse, more than one admission in a rehabilitation center, urban residents, and informal employment are independent predictors of high substance involvement.

Acknowledgment

I wish to express my sincere gratitude to my Supervisor Dr Erigene RUTAYISIRE, all Lecturers and Staff in the School of Social Sciences for their academic advice and National Rehabilitation Center for their assistance during research project.

Funding:
No funding from any entity

Conflict of interest:
None declared

Ethical approval:
This study obtained ethical approval from the postgraduate department of Mount Kenya University and National Rehabilitation Service.

References

Alotaibi, S. A., & Durgampudi, P. K. (2020). Factors associated with tobacco smoking among Saudi college students: a systematic review. *Tobacco Prevention & Cessation, 6*, 36.

Andersson, H. W., Wenaas, M., & Nordfjærn, T. (2019). Relapse after inpatient substance use treatment: a prospective cohort study among users or illicit substances. *Addictive Behaviors, 90*, 222-228.

Balasubramani, K., Paulson, W., Chellappan, S., Ramachandran, R., Behera, S. K., & Balabaskaran Nina, P. (2021). Epidemiology, hot spots, and sociodemographic risk factors of alcoholic consumption in Indian men and women: analysis of notional family health survey-4 (2015-16), a nationally representative cross-sectional study. *Frontiers in Public Health, 9*, 1184.

Cambron, C., Kosterman, R., Rhew, I. C., Catalano, R. F., Guttmannova, K., & Hawkins, J. D. (2020). Neighborhood structural factors and proximal risk for youth substance use. *Prevention Science, 21*(4), 508-518.

Derefinko, K. J., Bursac, Z., Mejia, M. G., Milich, R., Lynam, D. R. (2018). Rural and urban substance use difference: effects of the transition to college. *The American Journal of Drug and alcohol abuse, 44*(2), 224-234.

Dugas, E. N., Sylvestre, M. P., Ewusi-Boisvert, E., Chaiton, M., Montreuil, A., & O'Loughlin, J. (2019). Early risk factors for daily cannabis use in young adults. *Canadian Journal of Psychiatry, 64*(5), 329-337.

Habiyaremye, F., Rwunganira, S., Musanabaganwa, C., Muhimpundu, M. A., & Omolo, J. (2019). Tobacco use and associated factors among Rwandan youth aged 15-34 years: findings from a nationwide survey, 2013. *Plos One, 14*(10), e0212601.

Humeniuk, R., Ali, R., Babor, T. F., Farrell, M., Formigoni, M. L., Jittiwutikarn, J., de Lacerda, R. B., Ling, W., Marseden, J., Monteiro, M., Nhiwatiwa, S., Pal, H., Poznyak, V., & Simon, S. (2008). Validation of alcohol, smoking, and substance involvement screening test (ASSIST). *Addiction, 103*(6), 1039-1047.

Kabisa, E., Biracyaza, E., Habagusenga, J. D. A., & Umubyeyi, A. (2021). Determinants and prevalence of relapse among patients with substance use disorder: case of Icyizere Psychotherapeutic Center. *Substance abuse: Treatment, Prevention, and Policy, 16*(1), 1-12.

Kanyoni, M., Gishoma, D., & Ndahindurwa, V. (2015). Prevalence of psychoactive substance use among youth in Rwanda. *BMC Research Notes, 8*(1), 1-8.

Khlat, M., van Cleemput, O., Bricard, D., & Legleve, S. (2020). Use of tobacco, alcohol, and cannabis in late adolescence: roles of family living arrangement and socioeconomic group. *BMC Public Health, 20*(1).

Knaappila, N. Marttunen, M., Fröjd, S., Lindberg, N., & Kaltiala, R. (2020). Change in cannabis use according to socioeconomic status among Finnish adolescents from 2000 to 2015. *Journal of Cannabis Research*

2(1). 1-9.

Lourde, L. R., & Kodali, P. B. (2020). Prevalence and risk factors of alcohol consumption behavior among late adolescents: evidence from Puducherry, India. *Journal of Mental Health and Human Behaviour, 25*(2), 100-105.

Maina, G., Ogenchuk, M., & Gaudet, S. (2021). Living with parents with problematic substance use: impact and turning points. *Public Health Nursing, 38*(5), 730-737.

Maithya, R. W. (2009). *Drug abuse in secondary schools in Kenya; developing a program for its prevention and control.* http://hdl.handle.net/10500/3433

Morales, A. M., Jones, S. A., Kliamovich, D., Harman, G., & Nagel, B. J. (2020). Identifying early risk factors for addiction later in life: a review of prospective longitudinal studies. *Current addiction Reports, 7*(1), 89-98.

Mukherjee, S., & Ghosh, S. (2022). A study on alcohol dependence and its determinants among male patients attending a tertiary care hospital, Kolkata. *Asian Journal of Medical Sciences, 13*(2), 136-142.

Nzamwita, J. N. (2017). Psychiatric co-morbidity among patients on rehabilitation for substances abuse in Icyizere Centre Kigali, Rwanda [Mount Kenya University]. http://197.243.10.178/handle/123456789/6383

Oyewole, B. K., Animasahun, V. J., & Chapman, H. J. (2018). Tobacco uses in Nigerian youth: a systematic review. *Plos One, 13*(5), e0196362.

Rioux, C., Castellanos-Ryan, N., Parent, S., Vitaro, F., Tremblay, R. E., & Séguin, J. R. (2018). Age of cannabis use onset and adult drug abuse symptoms: a prospective study of common risk factors and indirect effects. *Canadian Journal of Psychiatry, 63*(7), 457-464.

Rocca, G., Verde, A., & Gatti, U. (2019). Impact of alcohol and cannabis use on juvenile delinquency: results from an International Multi-City Study (ISRD3). *European Journal on Criminal Policy and Research, 25*(3), 259-271.

Tamson, M., Vorobjov, S., Sokurova, D., & Pärna, K. (2021). Cannabis use and associated factors among 15-16-year-old adolescents in Estonia 2003-2019: results from cross-sectional ESPAD surveys. *Nordic Studies on Alcohol and Drugs, 38*(3), 293-304.

Tucker, J. S., Rodriguez, A., Dunbar, M. S., Pedersen, E. R., Davis, J. P., Shih, R. A., & D'Amico, E. J. (2019). Cannabis and tobacco use and co-use: trajectories and correlates from early adolescence to emerging adulthood. *Drug and Alcohol Dependence, 204*, 107499.

United Nations Office on Drugs & Crime. (2015). *World Drug Report.*

Vásquez, A. L., Domenech Rodríguez, M. M., Barrett, T. S., Amador Buenabad, N. G., Gutiérrez Lopez, M. D. L., Bustos Gamiño, M. N., & Villatoro Velázquez, J. A. (2021). Parent characteristics and practices classify lifetime substance use among Mexican children. *International Journal of Mental Health and Addiction*, 1-15.

Yeung, E. W., Spychala, K. M., Miller, A. P., Otto, J. M., Deak, J. D., Kim, H., Gilder, D. A., Ehlers, C. L., Wilhelmsen, K. C., & Gizer, I. R. (2022). Effects of genetic risk for alcohol dependencies: a polygenic risk score approach. *Drug and Alcohol Dependence, 230*, 10977.