



UNIVERSITY *of* MARYLAND
SCHOOL OF NURSING

Substance Use Disorders and Type 2 Diabetes: Integration of Evidence- Based Diabetes Care to Promote Quality Health Outcomes

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November 14, 2023

Learning Objectives

At the conclusion of this webinar, participants will be able to:

1. Define diabetes mellitus (DM) and substance use disorders (SUD) and associated complications;
2. Identify the associated risks of developing type 2 diabetes mellitus (T2DM) in substance-using populations;
3. Illustrate the global epidemiological trends of SUD and DM; and
4. Apply health promotion and disease prevention framework in culturally diverse, substance using populations.

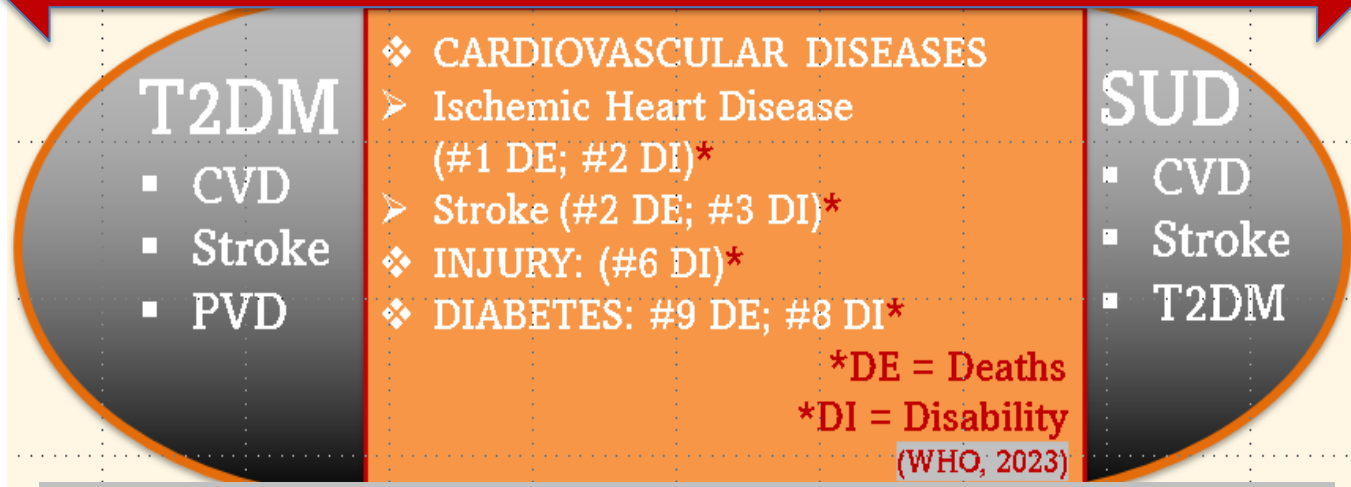
Obj. #1: Definitions and Associated Complications

- Diabetes Mellitus (DM)
 - Chronic, metabolic, systemic

- Substance Use Disorders (SUD)
 - Chronic, complex brain disease

More than 95% of all global diabetes cases are type 2 diabetes

SUD: Problematic Use Despite Consequences



(Tomic, Shaw, & Magliano, 2022; Fornili & Fogger, 2022; NIDA, 2022; WHO, 2023)

SUD Related Complications [Morbidity and Mortality]

Prevalence of Diabetes Related Complications Among Individuals with SUD

Categories of Substance Use Disorders [Prevalence]	Cerebro-Vascular Accident	Diabetic Neuropathy	Diabetic Renal Disease	Myocardial Infarction	All-Cause Mortality
Percent (%)					
Tobacco [21.8]	5.8	18.2	12.5	5.3	12.9
Opioids [1.9]	5.2	16.2	9.9	4.9	12.7
Cocaine [2.2]	7.7	19.7	12.4	5.2	12.0
Cannabis [1.1]	4.3	16.7	10.9	4.8	8.3
Alcohol [8.0]	5.7	18.1	12.1	4.9	17.0

Winhusen, Theobald, Kaelber, & Lewis, 2019

Obj. #1: Other Complications

Traditional & Emerging

- Nephropathy
- Retinopathy
- Neuropathy
- Cancer
- Infections
- Functional Disability
- Cognitive Disability
- Prenatal Exposures



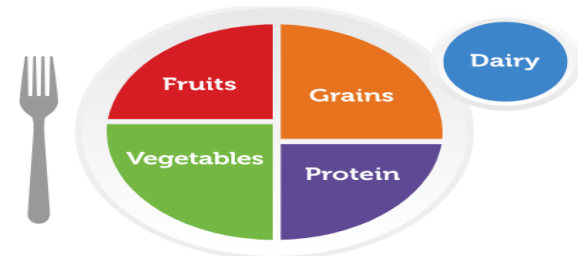
- Global rate of diabetics with kidney failure ↑ from 42% in 2005 to 52% in 2019.
- Nigeria = 32%

In 2019, diabetes and kidney failure cause approx. 2 million deaths

(CDC, 2022; Tomic et al., 2022; Ovwasa et al., 2023; Phillips et al., 2021; WHO, 2023)

DPP Landmark Studies and Outcomes

- Finnish Diabetes Prevention Study (522 participants)
- Diabetes Prevention Study (3234 participants)
- STOP NIDDM (1429 participants)
- Da Quig Study (577 participants)



MyPlate.gov

10-Year Outcomes Report

- Reduced new onset T2DM.
- Reduced cardiovascular risk factors.

Temprosa & Marinella (2023)



Obj. #1: Burden of SUD and T2DM

- Co-occurrence of SUD & T2DM can have severe consequences:

- Individual
- Family
- Community
- Local
- Regional
- Global

COMPLICATIONS OF T2DM

- Cost of Hemodialysis in Nigeria per session
₦36,000.00 (\$100) –
₦70,000.00 (\$200)



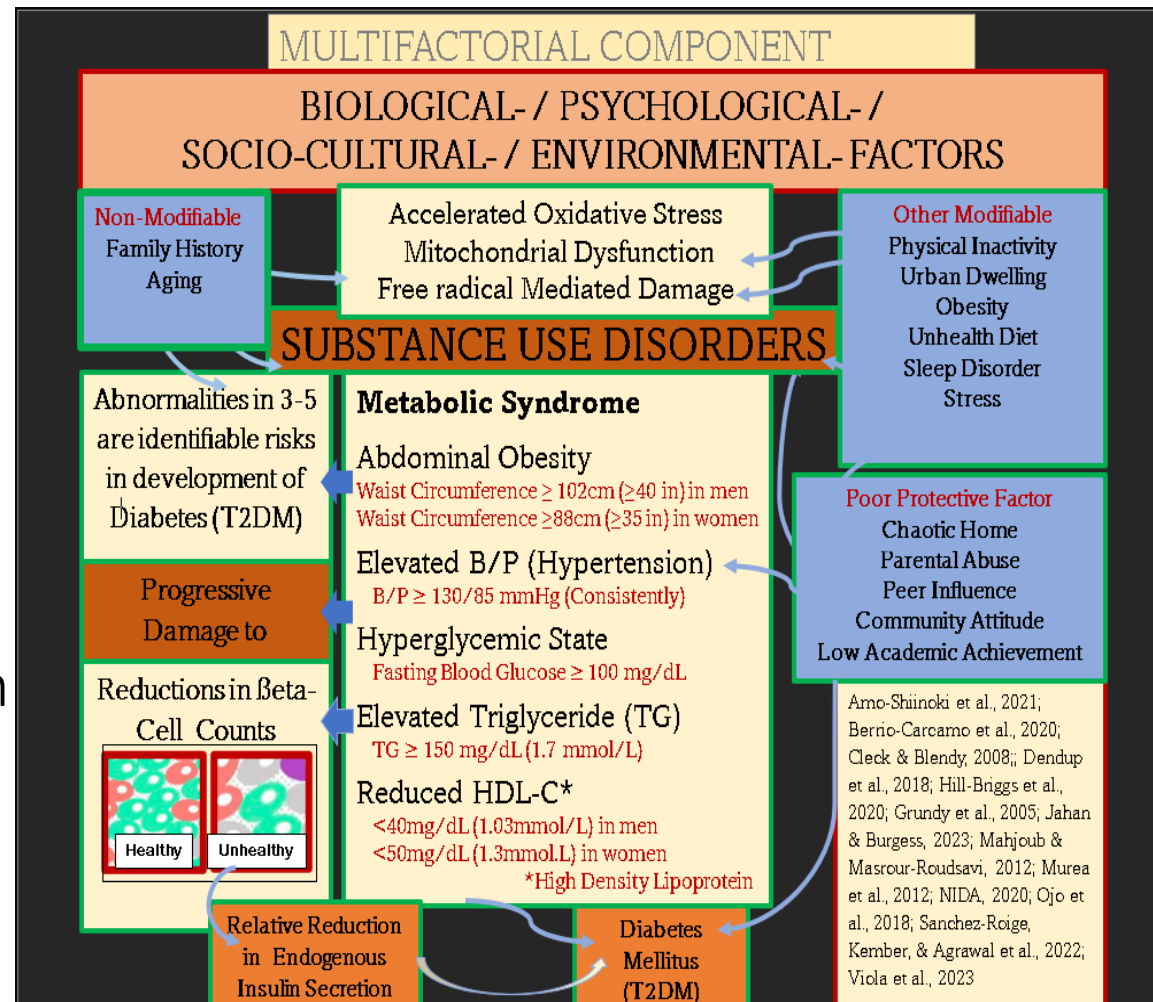
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No matter where you are in the world, dialysis costs are high.

Forthal et al., 2021; Mushi, Marschall, & FleBa, 2015; NIDA, 2020; Okoye & Mamven, 2022

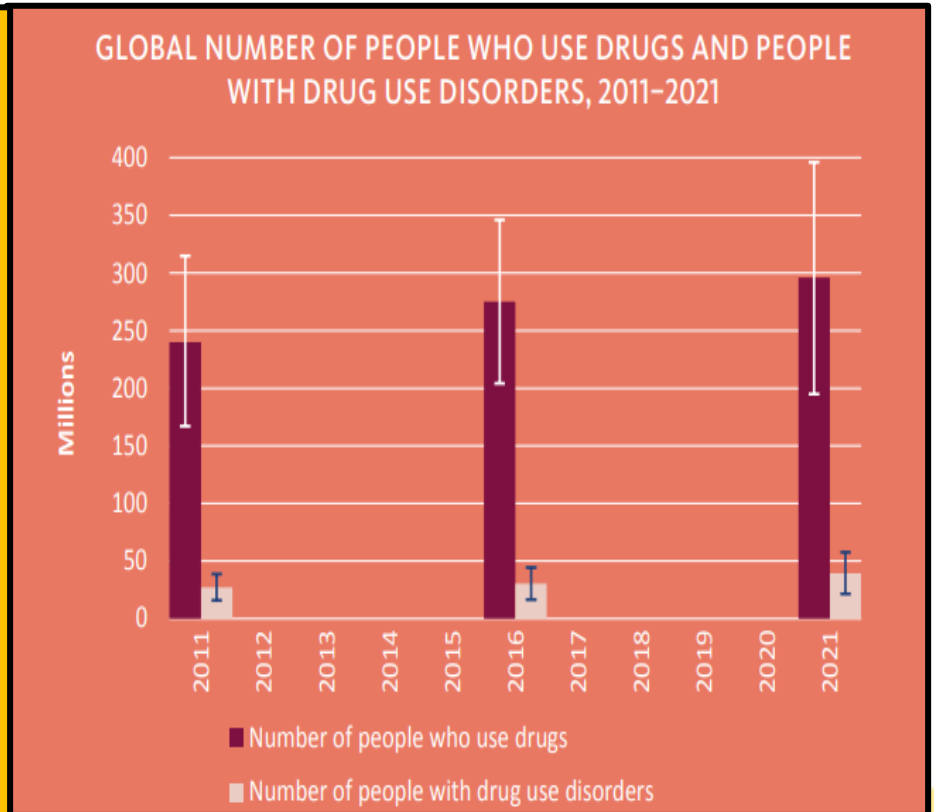
Obj. # 2: Progressions of SUD to T2DM

- **Risk Factors**
 - Complex
 - Multigenic
 - Heterogeneous
 - - Biological
 - - Psychological
 - - Socio-Cultural
 - - Environmental
- Mechanism of Action
 - Oxidative Stress
 - Primary
 - Cellular pathway



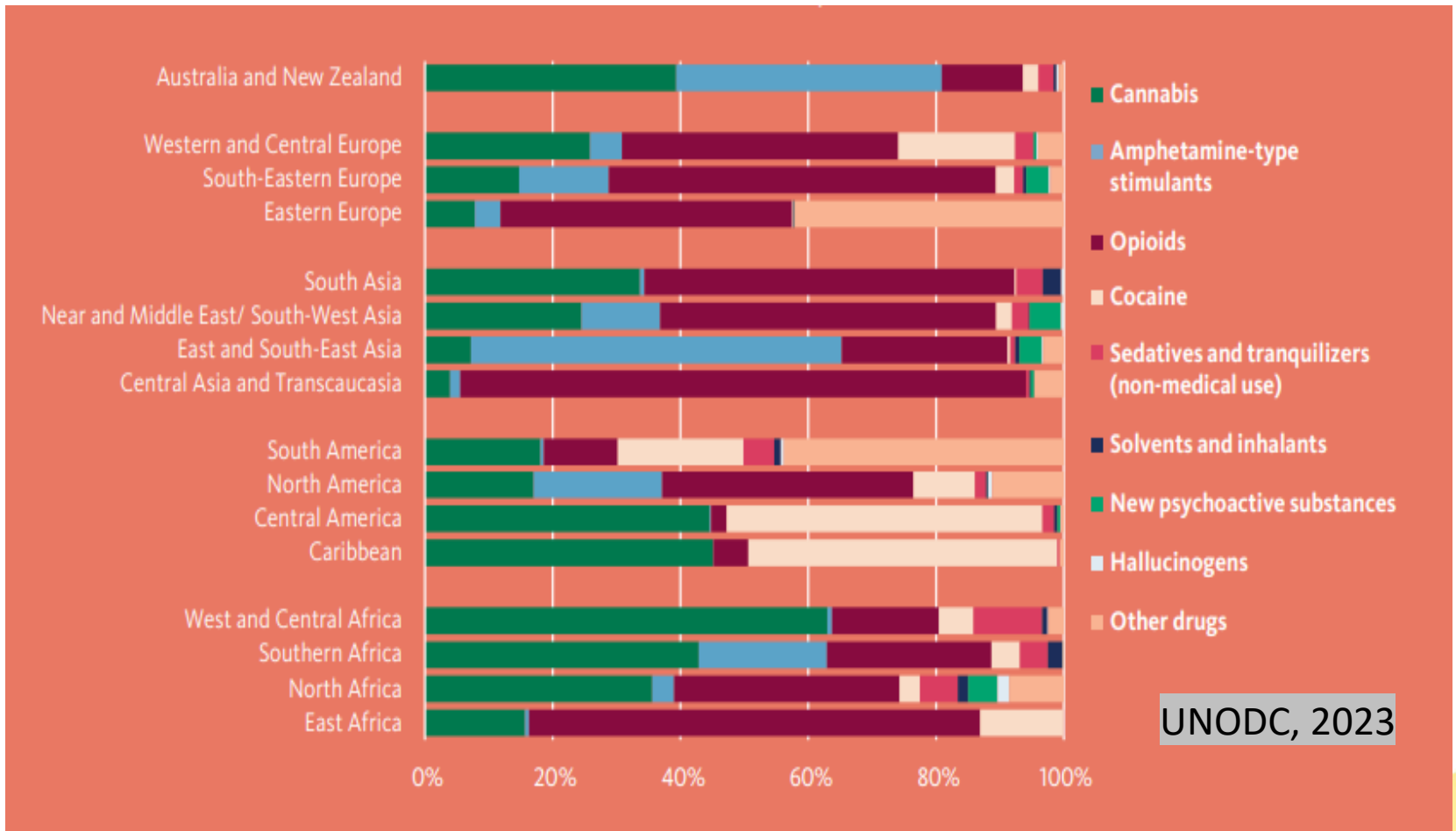
Obj. #3: Global Increase in Drug Use

- 1 in 17 people used at least a drug in 2021 .
- 23% ↑ in 2021 than last decades



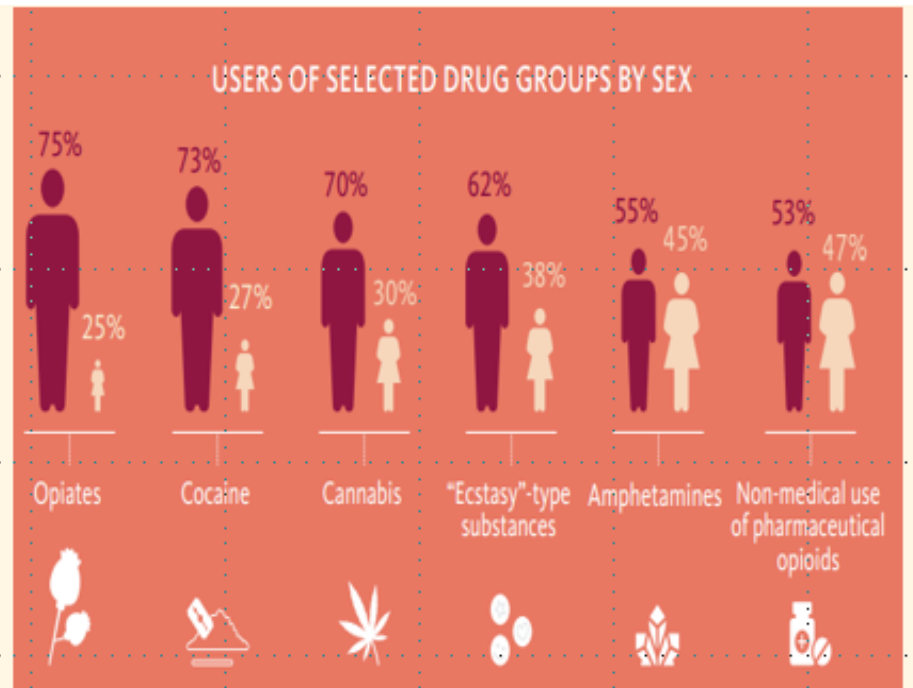
United Nations Office on Drugs and Crime [UNODC], 2023

Obj. #3: Increases in Global Market



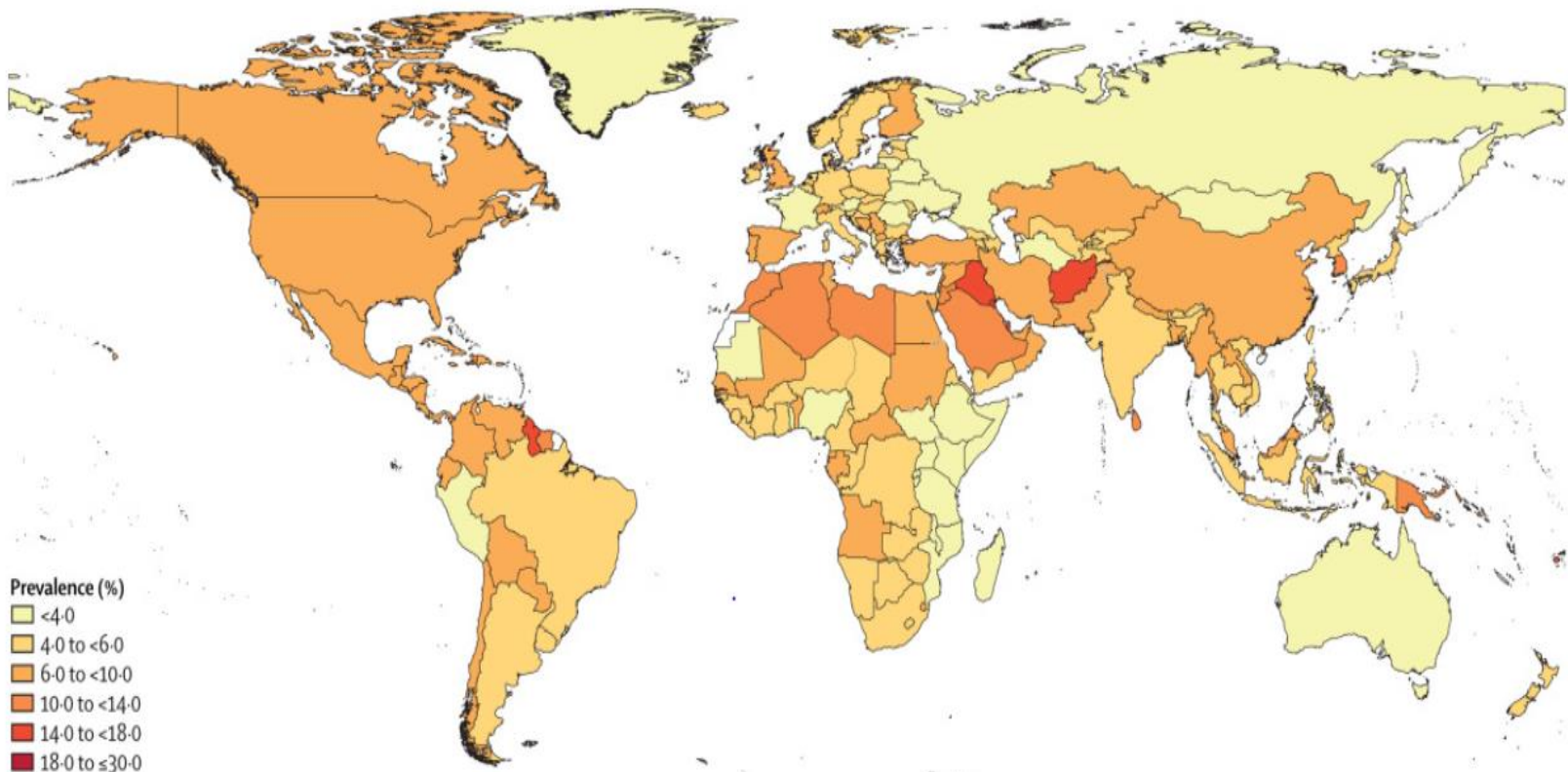
Obj. # 3: Cannabis and Opioids-Use Disorders

- Cannabis
 - Remains the most used drug, globally
- Opioid
 - ↑↑ rate of drug overdose and deaths



UNODC, 2023

Obj. #3: Global Burden of Diabetes



52.2% of global diabetes attributed to \uparrow body mass index (BMI) $\geq 25\text{kg/m}^2$

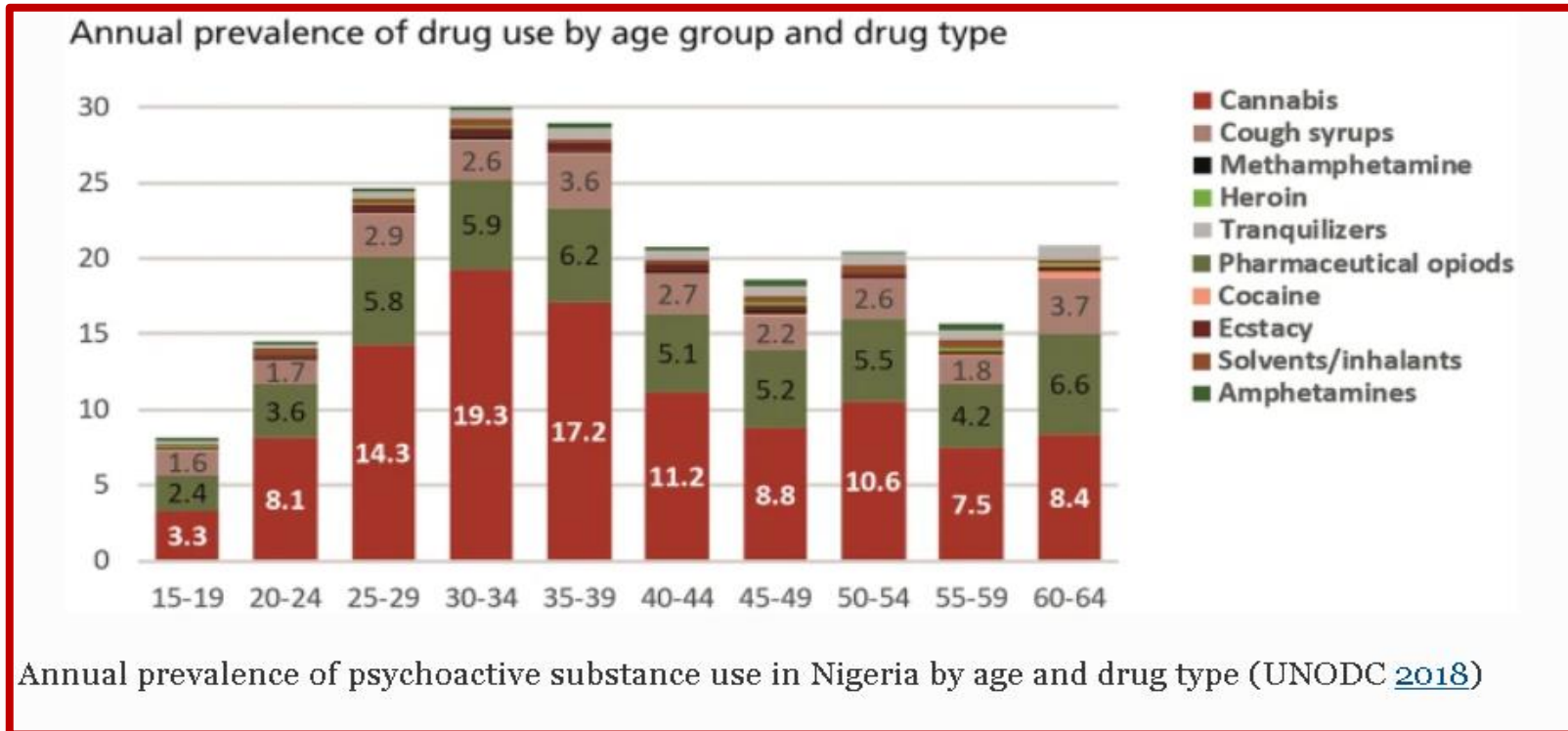
Global Burden of Disease [GBD] 2021 Diabetes Collaborators, 2023

Obj. #3: Diabetes Trend and Projected % Increase

Diabetes	# People Living With DM	# People Living with DM Undiagnosed	# DM Related Deaths in 2021	Predictions of (%) Increase by 2045
Africa (\$1.3 billion)	24 million	1 in 2 (>54%)	416,000	55 million (129%)
Europe \$1.89 billion in 2021	61 million	1 in 3 (>36%)	1.1 million	69 million
Middle East & North Africa	73 million	1 in 3	796,000	136 million
North America & Caribbean	51 million	1 in 4	931,000	63 million
South & Central America	32 million	1 in 3	410,000	49 million
South – East Asia	90 million	1 in 2	747,000	151 million
Western Pacific	206 million	1 in 2	2.3 million	260 million

International Diabetes Federation, 2022

Obj. #4: Cannabis in Nigeria



Cannabis (locally grown)

- ↑ in recreational use of cannabis
 - Worsened diabetes metabolic factors
 - ↑ increase risks for peripheral arterial occlusion
 - Myocardial infarction . Renal disease (Porr et al., 2020)

Translation of DPP: SUD Treatment Practice

There are multiple DPP translations in clients with severe mental illness. But there remains a huge gap in the evaluation of DPP among clients with SUD who are undergoing addiction treatments.

FIELD REPORT





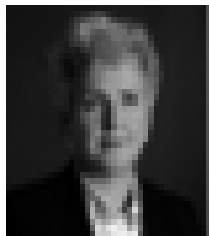
Greetings from IntNSA!



Katherine Fornili
IntNSA President (USA)
(2018-2020)



Elizabeth Ogunbily,
MPH, DAC, RPN, RN,
RM
President
IntNSA-Nigeria



Carmel Clancy
IntNSA President (UK)
(2020-2022)



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www.intnsa.org

www.intnsa.org/africa/nigeria/

- **Joseph Ogunbiyi:** BNSc., DAC, RPN, RM, RN – IntNSA-Nigeria Treasurer
- **Abisoye Makinde:** BNSc., DAC, RPN, RM, RN— IntNSA-Nigeria President-Elect

Early Adopters

Local to Global – Global to Local Collaborators

- **Local**

- John Oladejo, **MBBS, MS, MPH, PhD, FPHEM, FCMC, FIMS (NCDC, Nigeria)**
- Ogbemudia Ogbemor, **RN, RPN, MSc., M.Div, FWACN (MHN Consul. Aro, Nig)**
- Akanidomo Ibanga, **PhD (UNODC, Nigeria)**
- Francisca Okafor, **RN, BNSc., MPH, FWAPCNM, FHCBN (DNS, FMOH, Nig)**
- Dorcas Shonibare, **(DNS, Lagos-State MOH, Nig)**
- Olushola Aketi **(DDNS, Lagos-State MOH, Nig.)**
- Clara Lawal, **(RN, RM, RNT, PhD (Retired HOD, Babcock University, Nig.)**

- **Global**

- Virginia Rowthorn, **JD, LLM (UMB - Global Center for Engagement)**
- Yolanda Ogbolu, **PhD, NNP, FNAP, FAAN (Dean, UMB - School of Nursing)**
- Lynn Chen **PhD (Program Evaluator, UMSON)**
- Charon, Burda, **DNP, PMHCNS, PMHNP-BC, CARN-AP (Retired, UMB)**
- Abel Basutu, **PhD (African Union)**

Obj. #4: Field Experience: Nigeria-Based DPP Translation

- **Aim:** To reduce the risk of T2DM in individuals undergoing SUD maintenance treatments.
- **Goals:**
 - To promote quality health outcomes among clients receiving SUD treatment at this stand-alone federal center.
 - To raise awareness of the benefit of screening and referring clients with high-risk to Diabetes Prevention Program [DPP].

Obj. #4: First-Translation of Evidence-Based DPP

- **Based on theory**

- Replicating Effective Programs (REP)

- Pre-condition
 - Pre-implementation
 - Implementation
 - Maintenance features

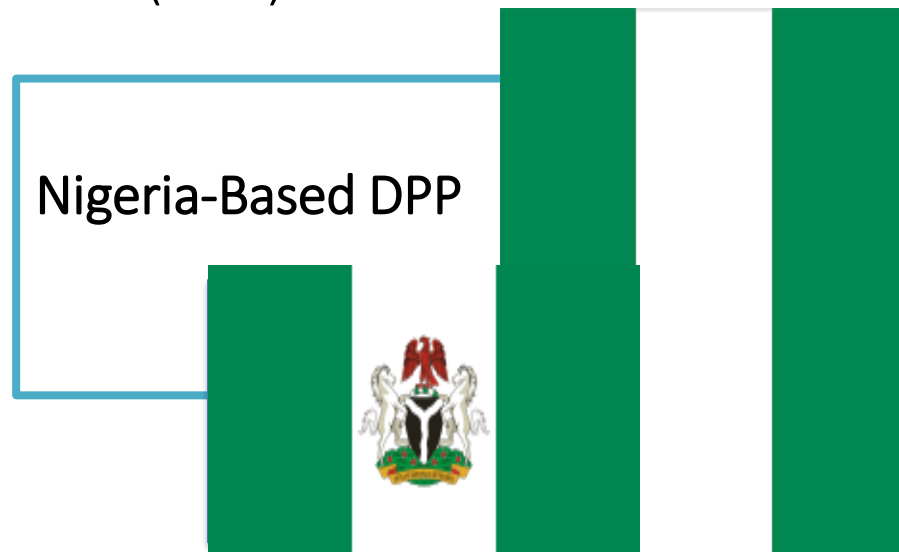
- **Systematically Planned**

- Innovative approach

- **Translation:** Data into priorities

- **Facilitated by knowledgeable and competent staff**

- Client-centered and age-appropriate interventions
 - Nurse-Led
 - Frequently evaluated



Obj. #4: Interprofessional and Intercontinental Collaborating Team

NURSING

Primary Investigator: UMSON (BALTIMORE, MD, U.S.A)

Oluremi A. Adejumo, DNP, MS., RN, FIAAN, CGNC - Assistant Professor

Co-Investigator: UITH (UITH, ILORIN, KWARA – STATE, NIGERIA)

Elizabeth O. Ogunbiyi, MPH, DAC, RPN, RN, RM.- Deputy Director of Nursing

BIOSTATISTICIAN

Co-Investigator: UMSON (BALTIMORE, MD, U.S.A)

Lynn Chen, PhD - Assistant Professor & Director of Evaluation (UMSON)

OTHERS: PSYCHIATRIST / COUNSELLORS / PEER EDUCATORS/ PATIENTS

- Drug Addiction Treatment Education and Research (DATER), NIG
- Institute of Medical Research and Training (IMRAT), NIG

Obj. #4: Screened and Referred to DPP

- Unit campaign
- Validated risk assessment tool
- Screened clients for T2DM
- Diabetes Risk Assessment
 - Scores < 15
 - Scores ≥ 15

Diabetes Risk Assessment Scores < 15

- Observe and repeat in one year

Diabetes Risk Assessment Scores ≥ 15

- Send for Diagnostic Lab. Test (A1C, fasting blood glucose, or oral glucose tolerance test)
- Normal Glucose Lab. Range: Refer to DPP.

Prevention of Diabetes

```
graph LR; A[Lifestyle modification] --> B[Healthy Eating]; A --> C[Regular Exercise];
```

The diagram illustrates the components of lifestyle modification for diabetes prevention. A central box labeled 'Lifestyle modification' has two arrows pointing to 'Healthy Eating' and 'Regular Exercise'. 'Healthy Eating' is accompanied by an illustration of various fruits and vegetables, while 'Regular Exercise' is accompanied by an illustration of three people running on a track.

- High Glucose Lab. Range: Refer to diabetes treatment and education.

(ADA, 2022)

Selection of Study Participants

- # screened ----- 80
- # retained ----- 50
- # in session zeros ----- 35
- Attrition ----- 7
- # in session 26 ----- 28

Study Participants' Characteristics

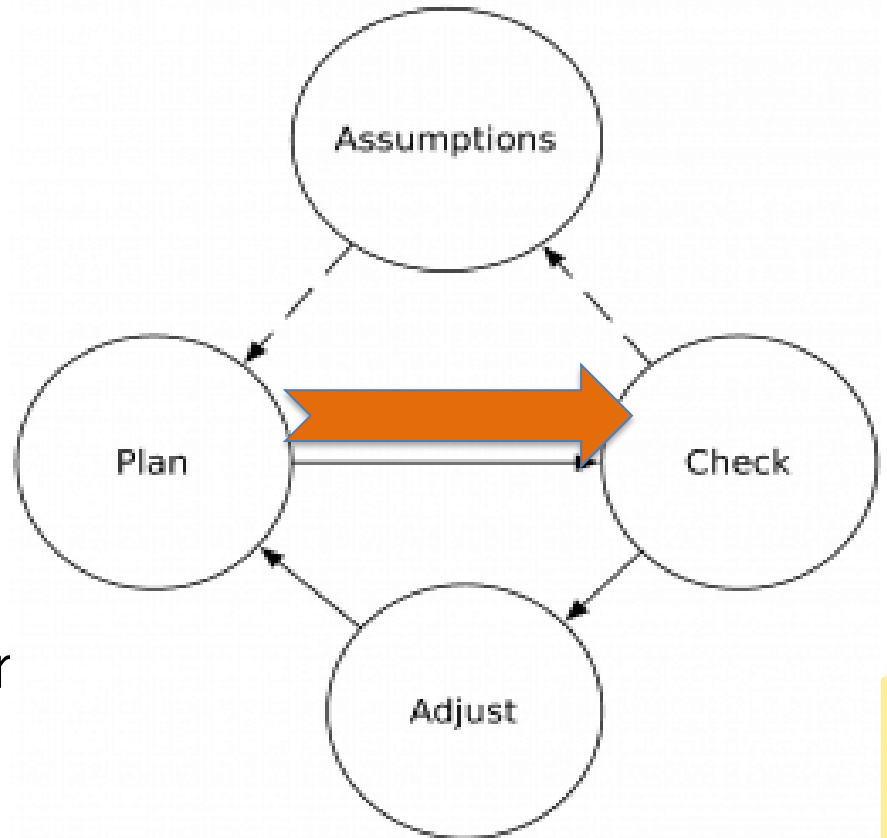
Baseline Characteristics (n=28)	%	Range	Mean (SD)
Age (year)		22-59	36.8(9.2)
Weight (kg)		54-93	73.2(9.8)
Height (cm)		154-188	171(8.5)
BMI (k/m2)		18.2-29.0	25.0(2.4)
Finnish Diabetes Risk Assess. Score		15-21	16.8(1.4)
Gender			
Male (n=23)	82.1		
Female (n=5)	17.9		
Education			
=< Pri. Sch. or Less (n=0)			
Some SS (High Sch.) (n=2)	3.1		
Gra. SS (High Sch.) (n=3)	9.3		
Some College /Tech. Sch. (n=6)	18.6		
Bachelor's Degree (n=7)	27.1		
Graduate Degree (n=9)	41.9		

Study Participants' Characteristics (Cont.)

Baseline Characteristics (n=28)	Percent (%)
Marital Status	
Married (n=9)	32.1
Never Married (n=16)	57.1
Divorced (n=3)	10.7
<u>Lifestyle Behavior: Current Status of Use</u>	
Tobacco (n=12)	42.9
Alcohol (n=27)	96.4
Cannabis (n=27)	96.4
Heroin (n=28)	0.0

Interventions: June 2022- June 2023

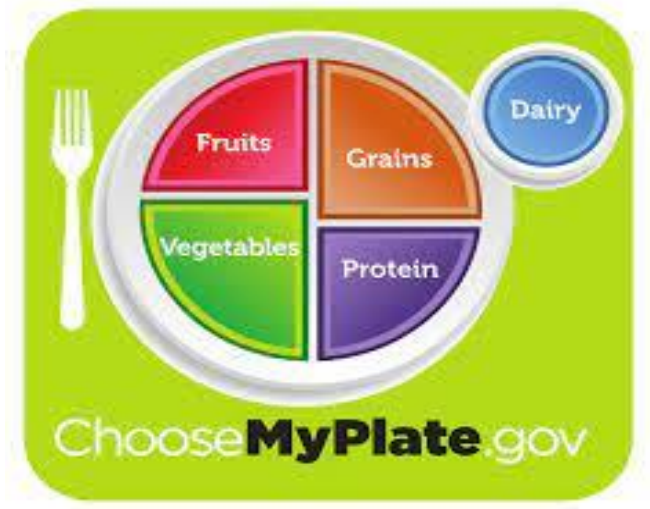
- 26 Session DPP
- Duration: One year-long DPP
- Support: Ongoing
 - Weekly virtual meetings
 - 12 Weeks
 - Ongoing feedback
 - Process evaluation
- Lead nurses
 - Pre-session mentoring
 - Guidance to peer educator



Outcomes: Six-Month DPP Interventions

Preliminary Report: Baseline to Session 20 (First 6-Months)

- Paired t-test: Baseline to session 20
 - Stat. Sig. ↓ in weight*
 - Stat. Sig. ↓ in BMI*
 - Stat. Sig. ↑ dietary portion control *
 - No sig. diff. in dairy products consumption**
 - Stat. Sig. ↑ in Physical activities*
 - Stat. Sig. ↓ in alcohol intake*
 - No sig diff. in smoking**
 - No sig. diff. in cannabis use**
- * $p < 0.001$
** $P > 0.01$



Outcomes: Pre- and Post-Interventions


SESSIONS 21-26 (Last 6-Months)	Pre-Lifestyle Intervention Mean (SD)	Post-Lifestyle Intervention Mean (SD)	<i>p</i>	<i>Cohen's d</i>
Weight (kg)	73.2 (9.8)	70.7 (9.1)	<0.001	1.56
BMI (kg/m ²) *	25.0 (2.4)	24.1(2.2)	<0.001	1.65
# of Days Per Week Study Participants Adhered to Recommendations of:				
Physical Activity	3.7 (3.3)	19.6 (2.6)	<0.001	3.57
Water Intake (Replaced SSB with Water)*	9.1 (5.2)	19.4 (0.9)	<0.001	1.93
Fruits and Vegetables Intake*	11.6 (6.6)	19.4 (1.0)	<0.001	1.16
Grains Intake*	13.6 (6.3)	19.2 (1.0)	<0.001	0.91
Proteins Intake*	11.1 (6.3)	19.6 (1.0)	<0.001	1.38
Dairy Product Intake	11.3 (6.4)	9.1 (0.8)	0.71	0.36
# of Days Per Week Study Participants:				
"Cut Back" on cigarettes Use	3.8 (3.0)	2.6 (2.9)	0.054	0.36
"Cut Back" on alcohol intake	4.6 (3.0)	2.1 (2.7)	<0.01	0.80
"Cut Back" on cannabis intake	5.3 (2.8)	4.8 (3.0)	0.384	0.11

Note: Paired t-test and Wilcoxon test were used / * Normality was not met

Maintenance Strategy: 2023-2026

- Outcome Evaluation and Dissemination
 - Translated findings
 - Planning priorities for actions
- Maintenance and Ongoing Evaluation
 - Strengthening nursing capacity
 - **Goal:** Sustaining DPP
- Lessons Learned
 - Barriers and facilitators

Limitations

- Recall bias
 - Socio-political, economic challenges
 - Brain Drain
 - Nurses and healthcare workers' migration
 - Inter-professional rivalries
- 

Nursing Implication

- Nurses as healthcare facilitators:
 - Influencing contributors in healthcare systems.
 - Influencing facilitators of health promotion and prevention of illness.
 - Catalyst for health equity improvement

References

- Amo-Shiinoki, K., Tanabe, K., Hoshii, V., Matsul, H., Harano, R., Fakuda, T., Takeuchi, T., Bouchi, R., Takagi, T., Hatanaka, M., Takeda, K., Okuya, S., Nishimura, W., Kudo, A., Tanaka, S., Tanabe, M., Akashi, T., Yamada, T., Ogawa, Y., Ikeda, E., Nagano, H., & Tanizawa. (2021). Islet cell dedifferentiation is a pathologic mechanism of long-standing progression of type 2 diabetes. *JCI Insight*, *6*(1), e143791. <https://doi.org/10.1172/jci.insight.143791>
- Berríos-Cárcamo, P., Quezada, M., Quintanilla, M. E., Morales, P., Ezquer, M., Herrera-Marschitz, M., Israel, Y., & Ezquer, F. (2020). Oxidative stress and neuroinflammation as a pivot in drug abuse. A focus on the therapeutic potential of antioxidant and anti-inflammatory agents and biomolecules. *Antioxidants (Basel)*, *9*(9), 830. <https://doi.org/10.3390/antiox9090830>
- Centers for disease prevention and control (CDC). (2022, June 21). Kidney failure and diabetes. <https://www.cdc.gov/diabetes/resources-publications/research-summaries/kidney-failure-diabetes.html>
- Forthal, S., Choi, S., Yerneni, R., Zhang, Z., Siscovick, D., Egorova, N., Mijanovich, T., Mayer, V., & Neighbors, C. (2021). Substance use disorders and diabetes care: Lessons from New York health homes. *Med Care*, *59*(10), 881-887. <https://doi.org/10.1097/MLR.0000000000001602>
- Fowler, A. (1999), Feedback and feedforward as systemic frameworks for operations control. *International Journal of Operations & Production Management*, *19*(2), 82-204. <https://doi.org/10.1108/01443579910247428>
- GBD 2019 Diseases and Injuries Collaborators. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: A systematic analysis for the Global Burden of Disease Study 2019. *Lancet*, *396*(10258), 1204-1222. [https://doi.org/10.1016/S0140-6736\(20\)30925-9](https://doi.org/10.1016/S0140-6736(20)30925-9).
- GBD 2021 Diabetes Collaborators*. (2023). Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: a systematic analysis for the Global Burden of Disease Study 2021. *The Lancet*, *402*, 203-234. <https://www.thelancet.com/action/showPdf?pii=S0140-6736%2823%2901301-6>
- International Diabetes Federations [IDF]. (2022). IDF diabetes atlas. <https://diabetesatlas.org/>
- Kilbourne, A.M., Neumann, M.S., Pincus, H.A., Bauer, M. S., & Stall, R. (2007). Implementing evidence-based interventions in health care: application of the replicating effective programs framework. *Implementation Sci*, *2*, 42.. <https://doi.org/10.1186/1748-5908-2-42>
- Knudsen, A. K., Haro, J. M., Patton, G., Kopec, J., Malta, D. C., ..., Vos, T. (2018). The global burden of disease attributable to alcohol and drug use in 195 countries and territories, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *The Lancet Psychiatry*, *5*(12), 987-1012. [https://doi.org/10.1016/S2215-0366\(18\)30337-7](https://doi.org/10.1016/S2215-0366(18)30337-7)
- Wu, L. T., Ghitza, U. E., Zhu, H., Spratt, S., Swartz, M., & Mannelli, P. (2018). Substance use disorders and medical comorbidities among high-need, high-risk patients with diabetes. *Drug and Alcohol Dependence*, *186*, 86-93.
- Mushi, L., Marschall, P., Fleßa, S. (2015). The cost of dialysis in low and middle-income countries: A systematic review. *BMC Health Serv Res*, *5*, 506. <https://doi.org/10.1186/s12913-015-1166-8>
- National Institute on Drug Abuse [NIDA]. (2020, July 13). Drug Misuse and Addiction. <https://nida.nih.gov/publications/drugs-brains-behavior-science-addiction/drug-misuse-addiction>
- Ojo, O., Wang, X. H., Ojo, O. O, & Ibe, J. (2018). The effects of substance abuse on blood glucose parameters in patients with diabetes: A systematic review and meta-analysis. *Int J Environ Res Public Health*. *15*(12), 2691. <https://doi.org/10.3390/ijerph15122691>
- Okoye, O. & Mamven, M. (2022). Global Dialysis Perspective: Nigeria. *Kidney360*, *3*(9),1607-1610. <https://doi.org/10.34067/KID.0002312022> .
- Owuasa, H., Aiwuyo, H. O, Okoye A OC, Unuigbo E, Rajora N. Epidemiology Trend of Chronic Kidney Disease in a Semi-Urban Tertiary Hospital in Sub-Saharan Africa. *Cureus*. 2023 Mar 30;*15*(3):e36912. doi: 10.7759/cureus.36912
- Phillips, J., Chen, J. H. C., Oci, E., Prunster, J., & Lim, W. H. (2021). Global epidemiology, health outcomes, and treatment options for patients with type 2 diabetes and kidney failure. *Frontiers in Clinical Diabetes Healthcare*, *2* <https://doi.org/10.3389/fcdhc.2021.731574>
- Substance Abuse and Mental Health Services Administration [SAMHSA]. (2013). Diabetes care for clients in behavioral health treatment. *SAMHSA Advisory*, *12*(1), 1-12. <https://store.samhsa.gov/sites/default/files/d7/priv/sma13-4780.pd>
- Temprosa, Marinella (2023). Diabetes Prevention Program Outcomes Study (V5) [Dataset]. NIDDK Central Repository. <https://doi.org/10.58020/66x5-8y21>
- Tomic, D., Shaw, J. E., & Magliano, D. J. (2022). The burden and risks of emerging complications of diabetes mellitus. *Nat Rev Endocrinol*, *18*(9):525-539. <https://doi.org/10.1038/s41574-022-00690-7>
- United Nations Office on Drugs and Crime [UNODC]. (2023). World drug report. <https://www.unodc.org/unodc/en/data-and-analysis/world-drug-report-2023.html>
- Viola T. W., Orso, R., Florian, L. F, Garcia, M. G, Gomes, M. G. S., Mardini, E. M., Niederauer, J. P. O., Zaparte, A., & Grassi-Oliveira, R. (2023). Effects of substance use disorder on oxidative and antioxidative stress markers: A systematic review and meta-analysis. *Addict Biol*. *28*(1):, e13254. <https://doi.org/10.1111/adb.1325>
- WHO. (2023, April 05). *Diabetes: Key facts*. <https://www.who.int/news-room/fact-sheets/detail/diabetes>

Special Acknowledgements

- **Charlotte Sisson** – Bureau of International Narcotics and Law Enforcement
- **Joanna Travis-Roberts** – International Society of Substance Use Professionals
- **Kevin Mulvey** – International Consortium of Universities for Drug Demand Reduction
- **Carmel Clancy** – International Nurses Society on Addictions (IntNSA)
- **Katherine Fornili** – IntNSA Fellows' President - International Academy of Addictions Nursing / Mentor (UMSON / IntNSA)
- **Dana Murphy-Parker** – IntNSA President –Elect
- **Charon Burda** – Mentor (UMSON / IntNSA)
- **Elizabeth Ogunbiyi** – Nigeria-Based Collaborator
- **Lynn Chen** – U.S. Based Collaborator

Thank You All For Attending!

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