2023 Challenge Case on Mental Health

Each academic year, the Office of the Provost identifies a theme that unites the University of Pittsburgh (Pitt) community. This year the university has announced 2022-23 as the year of emotional well-being. Pitt believes in not only supporting students, faculty, and staff navigating these new terrains but also investing in research and reflection that could help find innovative solutions to this ever-growing challenge.

Mental health challenges are becoming more pervasive and reaching unprecedented levels. The good thing is that talking about mental health is much more mainstream than ever before, and people are recognizing some of their struggles may be a medical (mental health) issue. The challenge is that we are facing a critical "supply/demand" imbalance, where the need for services is greater than ever before, but the support network for people (supply) is significantly lacking. This support network could include anything from professionals (such as psychiatrists, psychologists, and licensed counselors) but also may include other support resources such as teachers, supervisors, employers, and community advocates.

The core focus of this year's Super Analytics Challenge is how to address the increase in demand (need) and the shortage of support (supply).

1) Understanding the increase in demand

The demand side problem of mental health refers to more people recognizing that challenges in their lives may be due to a medical condition and thus they are more apt to seek help or be evaluated for a diagnosis as well as a significant increase in the past few years of diagnoses of a spectrum of mental health illnesses. Compounding the increase in demand are factors such as ta lack of awareness or understanding of mental health conditions, the stigma associated with seeking help, lack of access to affordable and accessible services, and lack of insurance coverage for mental

health services. These factors can make it difficult for individuals to receive the mental health care they need.

- According to the World Health Organization, one in four people in the world will be affected by mental or neurological disorders at some point in their lives. However, nearly two-thirds of people with a known mental disorder never seek help from a health professional.
- In the United States, it is estimated that about 1 in 5 adults (18.5%) experiences mental illness each year and around 1 in 25 (4%) adults live with a serious mental illness. However, less than half (43.8%) of adults with a mental illness received mental health services in the past year.
- Research by the National Alliance on Mental Illness (NAMI) shows that only 41% of adults in the U.S. with a mental health condition received mental health services in the past year. Additionally, African Americans and Hispanic Americans used mental health services at about one-half the rate of White Americans in the past year.
- In terms of cost, a study published by the Journal of the American Medical Association in 2018 found that the U.S. spent an estimated $201 billion on mental health care in 2016, with most of the spending going towards prescription drugs and hospital care.
- Public poll respondents in Pennsylvania ranked "mental health problems" as the most important health issue facing their communities. The percentage of adults reporting that their mental health was not good for 14 or more days in the past month before the survey, increased from 12% in 2014 to 14% in 2020. Youth mental health and crisis prevention are important issues for Pennsylvanians.

2) Barriers to mental health support (Supply constraints)

The supply-side problem of mental health refers to the barriers that prevent the provision and accessibility of mental health services and treatment. This can include factors such as a shortage of mental health professionals, inadequate funding for mental health services, lack of insurance coverage for mental health services, and lack of infrastructure to support mental health services in certain areas. There are various statistics that highlight the supply-side problem of mental health. Here are a few examples:

- Shortage of mental health professionals: According to the National Institute of Mental Health (NIMH), there is a shortage of mental health professionals in the United States, particularly in rural and underserved areas. For example, in 2019, there were only 9,600 psychiatrists working in rural areas, compared to 58,000 in urban areas.
- Inadequate funding for mental health services: According to the National Alliance on Mental Illness (NAMI), mental health services receive less funding than other health

services. For example, in the US, mental health services received just 5% of total health spending, even though mental illness accounts for about 25% of the total burden of disease.

- Lack of insurance coverage for mental health services: According to the National Alliance on Mental Illness (NAMI), many insurance plans do not cover mental health services to the same extent as physical health services. For example, in the US, only about half of adults with a mental health condition received mental health services in the past year, and this is partly due to lack of insurance coverage.
- Stigma: According to the World Health Organization (WHO), there is a strong stigma associated with mental illness and seeking mental health services. For example, in a survey by the WHO, almost 20% of people said they would not want to work with someone who had a mental illness and nearly 30% said they would not want to live with someone who had a mental illness.

It's important to note that these statistics may vary depending on the country or region, but the general trend is that the supply-side problem of mental health is a significant issue that affects the accessibility and provision of mental health services and treatment.

3) Impact of Covid-19 on Mental health services has compounded both the demand and supply challenge

The COVID-19 pandemic has had a significant impact on the demand for mental health services. Some of the ways that the pandemic has affected the demand for mental health services include:

- Increased demand for mental health services: The stress, uncertainty, and isolation caused by the pandemic have led to an increase in the number of people seeking mental health services. According to a survey by the American Psychiatric Association, nearly half of U.S. adults reported an impact on their mental health due to worry and stress
- Limited access to mental health services: The pandemic has forced many mental health providers to shift to virtual services, which may not be accessible or preferable for all patients, leading to limited access to mental health services.
- Disruption of continuity of care: The pandemic caused disruptions to mental health services, as well as to other health services, which can lead to a discontinuity of care for some individuals.
- Economic strain: The pandemic has led to economic strain for many families, which can cause stress and anxiety, and make it harder for them to access mental health services.
- Prioritization of physical health services: Due to the immediate and pressing nature of the pandemic, mental health services may have been deprioritized in some cases, leading to an increased backlog in appointments and longer wait times for mental health services.

4) The Challenge Objective with suggestive HIQs

The core focus of this year's Super Analytics challenge is how to address the increase in demand (need) and the shortage of support resources and services (supply) to support that demand.

The challenge advisory committee wants student teams to acquire data to utilize in a more predictive form of analytics, to help better serve the population of the community that is suffering from mental health issues. For instance, there are numerous ways that data and analytics-related solutions can increase the impact the communities and institutions are having, in various avenues.

We want the students to 'embrace' the topic, not just do analytics on data. We are asking you to take on a "persona" – someone in the supply or demand cycle and approach the case from that perspective. You are expected to be able to 'present' your persona – challenges, actions, relationships, impacts, rewards, motivators, etc.

Below are some suggested DEMAND SIDE personas but feel free to create your own

Quick Details	Full scenario
Person in Crisis: Emily, woman **Short scenario**: Second-year nursing student suffering from PTSD	A few days ago, Emily went shopping with her friends in a department store. Then she found a guy in his 50s collapsing by the escalator. She tried to perform CPR and treatment she learned from nursing school to save his life. Unfortunately, the treatment didn't go well, and he couldn't make it. Since then, Emily has suffered from PTSD, such as doubting and low self-esteem as a nursing student, and insomnia or nightmares.
Person in Crisis: John, retired widow, vet **Setting:** Man is home, call to resource line **Short scenario**: getting evicted from lifelong home, threatening suicide	At noon, call taker answers a call and a man, John, states he will be evicted that day from his home. He states he was told about funding that could pay arrears. He states that he owes $4000 in back payments. He says he is in his 80s and this has been his home for over 50 years where he and his wife raised their children. He states his wife is now deceased. He tells the call taker that he will not exit the house alive. The constable is scheduled to be there at 3:00 pm and he is prepared to kill himself prior to leaving the property.
Person in crisis: Yolanda, female, bank Vice President **Setting:** Corporate Office	Yolanda is a successful Vice President of a bank, has a family, and a nice home life. From all outward appearances 'has it all'. However, Yolanda is struggling at work, unable to deal with controversial issues, and finds herself 'frozen' at

Short scenario: Staring at computer screen afraid to send an email and attend a controversial meeting due to anxiety	her desk and before she knows it, the day is almost over, and she hasn't gotten her work done and now is even more anxious because she is facing tomorrow already a day behind.
Person in crisis: Mark, college Junior **Setting:** classroom **Short scenario:** Mark is a good student (A/B), but recently has started failing exams and is not showing up for class,	Mark is a Junior in college and has always been a very good student with a 3.8 GPA. Recently he has started failing tests, and is not regularly showing up for class. . Mark senses something is wrong, but doesn't know where to turn, who to go to, and no one seems to notice he's struggling.
Person in crisis: Melody, woman, 21 **Concerned caller:** Self **Setting:** dorm room **Short scenario:** A young, trans woman is considering suicide	Melody, a woman, 21, has been feeling sad for weeks, but this week had been particularly devastating. Her girlfriend had broken up with her last week for being too closed off emotionally. She received a bad grade on a paper she'd worked on for weeks. Recently, she came out to her parents; but felt judged and unsupported and was now avoiding them. She is sitting in her dorm on a Friday night while everyone else she knew was partying – she hadn't been invited. Melody isn't sure she wants to live her life anymore. She searches online for how to commit suicide and determines to call help line.

Source: Allegheny County Department of Human Services.

Below are some suggested SUPPLY SIDE personas but feel free to create your own

Psychiatrist	Prakash is a psychiatrist working at a local hospital, currently working 70 hours a week because of patient workload.
Professor	Hank is a college professor teaching 4 classes at a local university. He cares very deeply about his students, and notices when some of his students don't show up for class and wonders what if anything he can do.
Supervisor at Work	Haniyyah is a manger at a marketing company and supervises a team of 40 people. She herself deals with anxiety, and wishes her company would implement some mental health awareness programs because she thinks she could help them because she's been there.

Counselor	Veronica is a Licensed Clinical Social Worker who works at at the county health agency. She loves her job, but is faced with a backlog of patients she just doesn't have time to follow up on. She is fearing she is developing mental health issues herself because of how stressed she is supporting others.

Following are some suggestive HIQs the student teams can build after creating their personas:

DEMAND SIDE

- What can be done to identify mental health challenges earlier and preclude a greater need?
- Are there certain demographics where mental health needs are greater, and what can be done to impact those demographics (elderly, veterans, students, transgender, etc.)

SUPPLY-SIDE

- How can we set up a more efficient frontline workforce pipeline?
- What types of supply (treatment) should we plan for? (What is most needed, psychiatrists, counselors, teachers/supervisors with training, etc.)
- Treatment can influence overall health beyond mental health. How can we boost the impact of treatments?
- Are we matching people to the treatments that they truly need?
- Are we oversupplied in certain areas? And if so, can we shift those resources
- What most incents frontline workers? What drives retention? Are there things more than 'pay'

COMBINED DEMAND & SUPPLY HIQ

- How can we measure the demand and then match it with the supply?
- Where are the gaps – in terms of the most obvious need for mental health services versus the most limited supply of frontline service providers?
- How can we optimize the distribution of support?
- Are there wage gap disparities for frontline workers in the U.S.? "Jewel Denne quote: "A person working at Sheetz gets paid more than a person saving peoples' lives?

IMPACT

- What is the impact of improving one person's life?
- How to draw better and more positive outcomes?

- What is the ROI of investments in mental health treatment/prevention (e.g., should companies invest more in preventing or treating – should frontline workers' pay be increased – what's the business case), etc.?

5) Your Team's Answer to the Challenge

Your Team has been hired to provide the advisory committee with the objective of providing the following three-phase deliverable:

Phase 1. Problem Framing: The identification of a question to answer (the "High Impact Question") that can have a near-term impact on improving the mental health issue for the region and a clear articulation as to why this is the best HIQ to answer in the short term and long term. The benefits of answering the HIQ are a key component of the deliverable for this phase. This HIQ could be one of the questions that the Advisory Committee is currently contemplating (listed above) or an entirely new HIQ that has been developed by the Team. The Team can even modify one of the existing prompts to form a revised HIQ that they want to solve. However, the deployment must be cost-effective, in that the "solution" must be affordable and implementable. As part of Phase 1, your team is responsible to create persona for an individual or else a frontline worker, and then pose a high impact question to ask for that persona.

Phase 2. Solution Design and Modeling: A data and analytics model (or set of models) that provides the insights necessary to support the benefits articulated in the first phase of the deliverable. If the Team chooses to shift to another HIQ, based on judges' feedback, or data analysis yielding other avenues, they may do so. A reservoir of data has been provided to the Team, and further data may be provided by Allegheny County as requested by the Team – if such data is available. The Team may also acquire data from their own research or public sources to augment the data sources provided already. The Teams are to use their own database and modeling tools to provide the best model outputs and/or insights from the analytics that indicate the value of answering the HIQ.

Phase 3. Final Solution Presentation: Storytelling is a critical aspect of gaining organizational buy-in and resources. The delivery of a high-impact presentation (in a PowerPoint-like and/or multi-media format) to a senior management/advisory team will determine which recommendation will be implemented first. The presentation should be focused on a combination of impact, feasibility, and affordability.

6) Rubrics

Phase 1: Problem Framing
- How well thought out and researched was your Team's persona development?
- Did your Team generate original insights through your own research and community outreach to generate a thoughtful and enlightening persona?
- How well did the team define the problem through HIQ and are the elements of the HIQ defined in detail?
- Additional evaluation points will be credited to those teams that create an original HIQ or modify an existing HIQ which indicates the team's creativity and depth of knowledge.
- Is the quality of the research (i.e., pre-work) that supports the HIQ "high"?
- How well did the team communicate the expected solution/impact and does it match the HIQ?
- Is the team addressing a critical need?
- Is the expected use of the solution/model output well defined – i.e., how will it be used?
- Was there significant thought given to the data that is available to model a solution that could support your HIQ, and were creative new data sources identified?
- Is the proposed solution practical (think budget/cost, capability, resources) and can it be deployed?
- Does the HIQ lead to a possible solution that is practical and feasibly implementable (considering budget, cost, capability, resources)

Phase 2: Solution Design and Modeling
- Does your solution design and modeling address the needs identified for your Team's persona?
- How well did the team address the problem (as identified in Phase 1)? (Versus addressing a proxy for the problem – i.e., is the target the actual target)
- How performant is the model (e.g., accuracy)?
- Did the team select the right metric to optimize (e.g., specificity versus sensitivity)?
- Did the team drive the outcome to the cost (is the solution cost effective)?
- Is the solution/output:
    - Impactful/meaningful?
    - Usable/pragmatic?
    - Sustainable without significant maintenance?

Phase 3: Final Solution Presentation
Recommendation/Analysis

- The solution supports the persona developed in Phase 1 and refined in Phase 2?
- The solution is innovative, original, and creative.
- The solution is impactful and solves or has a positive impact on the problem.

- The solution has a component that is specific, feasible, and realistic and can be advanced in the next year.
- The solution demonstrates an understanding of the context and will actually make an impact on people's lives.
- The solution had that special awesomeness or "it-factor" – meaning novel and innovative.

Presentation
- Presenters worked well together as a team.
- The team's visuals support and enhance their presentation

7) Data Sources

The following is a resource of both research and literature related to mental health. This list also includes potential data sources that you may want to incorporate in your solution.

The Team is allowed and even encouraged to use any additional data sources they may find, as well as their own research in addition to the ones provided.

A survey report published by 'American Phycological Association' on work and well-being
Work and Well-being 2021 Survey report (apa.org)

Helping Communities Recover and Rebound from the Pandemic:
https://home.treasury.gov/system/files/136/October-2022-Quarterly-Reporting-Analysis-How-Governments-are-Addressing-Urgent-Needs.pdf

National Health Interview Survey (NHIS) on mental health
https://www.cdc.gov/nchs/fastats/mental-health.htm

An article published in 2022 on how Mental-health screenings for kids
More Kids Are Being Screened for Anxiety, Depression. But Then What? - WSJ

Anxiety and Depression Indicators
https://www.cdc.gov/nchs/covid19/pulse/mental-health.html

Improving Access to Children's Mental Health Care
https://www.cdc.gov/childrensmentalhealth/access.html

A video from a panel discussion including Pitt EMBA students on frontline worker
Pitt EMBA recording: on frontline workers and health care providers

Mental Health Care in the Last 4 Weeks

https://catalog.data.gov/dataset/mental-health-care-in-the-last-4-weeks

Death rates for suicide

https://catalog.data.gov/dataset/death-rates-for-suicide-by-sex-race-hispanic-origin-and-age-united-states-020c1

Household Pulse Survey

https://www.cdc.gov/nchs/covid19/health-care-access-and-mental-health.htm

School Health Policies and Practices Study

https://www.cdc.gov/healthyyouth/data/shpps/index.htm

Web-based Injury Statistics Query and Reporting System

https://www.cdc.gov/injury/wisqars/index.html

Youth Risk Behavior Surveillance System (YRBSS)

https://www.cdc.gov/healthyyouth/data/yrbs/index.htm

National Survey of the Diagnosis and Treatment of ADHD and Tourette Syndrome

https://www.cdc.gov/nchs/slaits/ns_data.htm

Using Analytics to Improve Community Health

https://www.sas.com/content/dam/SAS/en_us/doc/solutionbrief/analytics-improve-community-health-109792.pdf

Data for Good: Enhancing the Partnership of Public Service and Mental Health

https://www.sas.com/en_us/webinars/enhancing-the-partnership.html

Data.Gov provides a wealth of information – the link below has over 200 data stets around various aspects of mental health.

https://catalog.data.gov/dataset/?tags=mental-health

Dr. Josh Morgan Blog Series

https://blogs.sas.com/content/sascom/2022/10/12/supporting-mental-health-with-data-and-analytics-through-improved-education-policy/

https://blogs.sas.com/content/author/joshmorgan/

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