SLEEP AND HEALTH INSIGHTS REPORT

WELLNESS INITIATIVE | ANNUAL REPORT 2024

OVERVIEW

This project analyzes health and sleep data collected from a group of individuals in different occupations, focusing on their lifestyle, stress, and sleep quality.
 The primary objective is to identify patterns that impact sleep health and provide insights that can guide wellness programs, workplace health initiatives, and individual lifestyle recommendations.
 By leveraging SQL normalization and analytical querying, the project transforms raw health data into structured, actionable intelligence.

PROBLEM STATEMENT

The organization aims to understand the factors that influence poor sleep quality and health imbalances among working individuals.
Currently, the company lacks clear insights into:

- How occupation and stress levels impact sleep quality
- The role of physical activity in maintaining healthy BMI
- The prevalence of sleep disorders across different demographics

Without these insights, wellness programs and policy recommendations rely on assumptions rather than data-driven evidence.

What's Happening?

- The collected dataset includes personal details,sleep details and health details but was initially unstructured and unnormalized, making analysis difficult.
- No clear mapping existed between demographic details (age, gender, occupation) ,sleep details(sleep duration,quality of sleep,sleep disorder) and health metrics (stress, BMI, activity).
- As a result, identifying root causes of poor sleep or high stress levels was challenging.

SOLUTION GOAL

- To **clean, normalize, and structure** the dataset into relational tables — `Person`, `Sleep_details` and `Health_Info`.
- To analyze key health relationships using **SQL queries**, including:
    - How occupation affects stress and sleep quality
    - How activity and BMI influence overall health
    - Which age groups or occupations are most prone to sleep disorders
- To generate **insights for preventive health measures** and improved lifestyle recommendations.

DATA DESCRIPTION

Title: Sleep and Health Information Dataset

Sample Size: 374 Records | 12 Attributes

Data Type: Numeric, Text, and Categorical

Tables Created

- `Person` - Columns: `Person_ID`, `Age`, `Gender`, `Occupation`
- `Sleep_details` - Columns : `Sleep_ID`, `Person_ID`, `Sleep_Duration`, `Quality_Of_Sleep`, `Sleep_Disorder`
- `Health_Info` - Columns: `Health_ID`, `Person_ID`, `Physical_Activity`, `Stress_Level`, `BMI_Category`, `Heart_Rate`, `Daily_Steps`

Key Fields

- Person_ID, Sleep_ID, Health_ID
- Age, Gender, Occupation
- Sleep_Duration, Quality_Of_Sleep, Sleep_Disorder
- Stress_Level, BMI_Category, Physical_Activity, Heart_Rate, Daily_Steps

DATA CLEANING STEPS

- Removed duplicates (e.g., repeated records for same person)
- Normalized dataset into three relational tables:
    - **Person** (Demographics)
    - **Sleep** (Sleep details)
    - **Health_Info** (Health metrics)
- Standardized categorical text values (e.g., "None", "Sleep Apnea", "Insomnia")
- Verified referential integrity using **foreign key** relationships (`PersonID`)
- Ensured proper data types (numeric for metrics, text for categories)

DATA MODEL

The database follows a **1-to-1 relationship pattern**:

Each record in the `Person` table (one individual) connects to one record in

`Health_Info` table and one record in `Sleep_details` table

This structure allows efficient analysis of trends across demographics, occupations,

sleep details and health conditions.
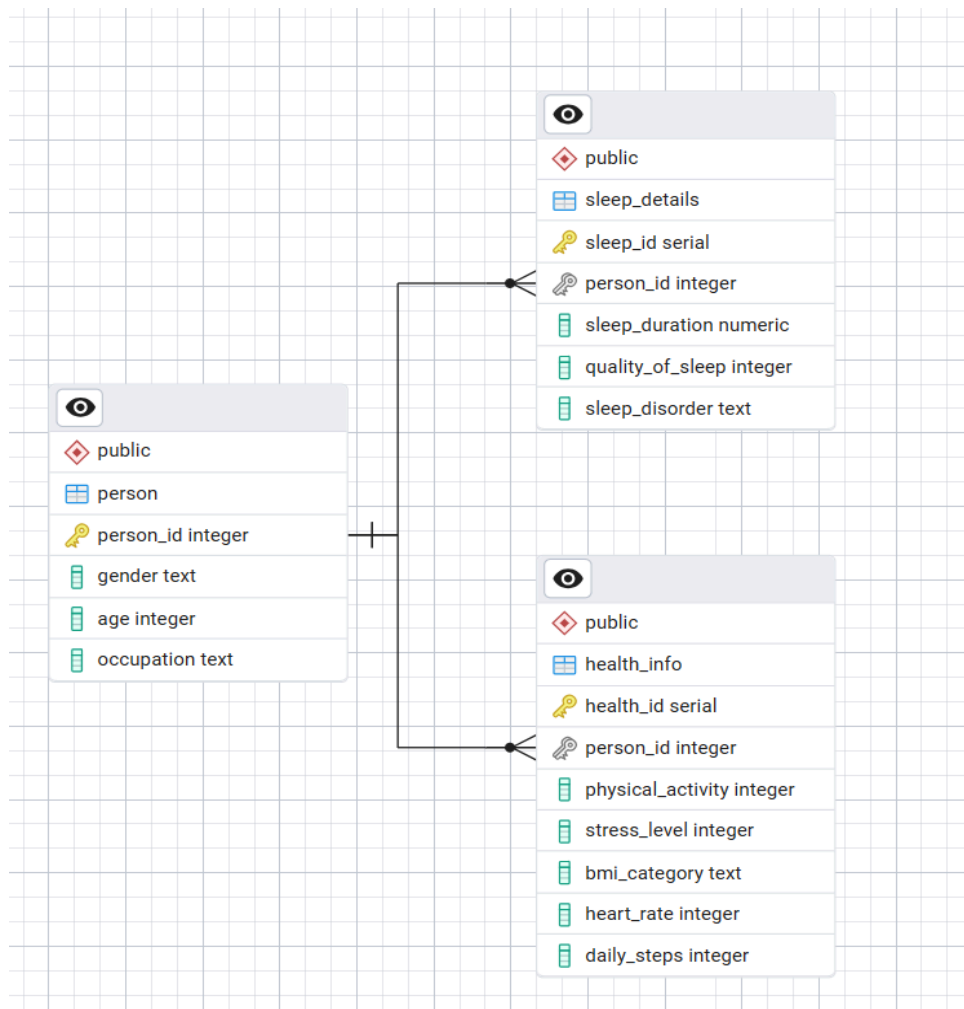
Category 1: Demographic Insights

1. Which occupation tends to get less sleep?

```sql
--- 1. which occupation tends to get less sleep?
select p.occupation, round(avg(s.sleep_duration),2) as avg_sleep
from Person p
join sleep_details s on p.person_id=s.person_id
group by p.occupation
order by avg_sleep asc;
```

	occupation text	avg_sleep numeric
1	Sales Representati...	5.90
2	Scientist	6.00
3	Salesperson	6.40
4	Teacher	6.69
5	Software Engineer	6.75
6	Manager	6.90
7	Doctor	6.97
8	Nurse	7.06
9	Accountant	7.11
10	Lawyer	7.41
11	Engineer	7.99

Insights:

- Sales Representatives sleep the least (5.9 hrs) due to demanding schedules or travel.
- Engineers balance stress and schedules better, improving sleep.
- Service roles (Nurses, Doctors) maintain near-normal sleep due to structured shifts.

2. Are males or females more stressed?

```sql
--- 2. Are males or females more stressed?
select p.gender,round(avg(h.stress_level),2) as avg_stress
from Person p
join health_info h on p.person_id=h.person_id
group by p.gender
order by avg_stress desc;
```

	gender text	avg_stress numeric
1	Male	6.08
2	Female	4.68

Insights:

- Males show higher stress (6.08 vs 4.68).
- Males dominate higher-stress occupations like Sales and Engineering.
- Females maintain lower stress — possibly due to better work-life balance or roles.

3. Which age groups shows the lowest sleep quality?

```sql
--- 3. which age groups shows the lowest sleep quality?
select case  when p.age between 20 and 29 then '20-29'
   when p.age between 30 and 39 then '30-39'
   when p.age between 40 and 49 then '40-49'
   else '50+'
   end as age_group,
  round(avg(s.quality_of_sleep),2) as avg_quality
from Person p
join sleep_details s on p.person_id=s.person_id
group by age_group
order by avg_quality asc;
```

	age_group text	avg_quality numeric
1	20-29	5.79
2	40-49	6.97
3	30-39	7.23
4	50+	8.17

Insights:

- **20–29 age** group sleeps poorly (lowest quality) — likely early career pressure.
- **50+** group has the **best quality (8.7)** — stable routines and lower stress.
- Mid-age **(30–39)** maintains moderate sleep quality.

Category 2: Sleep Patterns

4. Which BMI category has the lowest average quality of sleep?

```sql
---4. which BMI category has lowest average quality of sleep ?
select h.bmi_category, round(avg(s.quality_of_sleep),2) as avg_quality
from sleep_details s
join health_info h on s.person_id = h.person_id
group by h.bmi_category
order by avg_quality desc;
```

	bmi_category text	avg_quality numeric
1	Normal	7.66
2	Normal Weight	7.43
3	Overweight	6.90
4	Obese	6.40

Insights:

- Obese individuals have the lowest average sleep quality (6.4)
- **Normal BMI group sleeps best (7.66)**, suggesting that maintaining a healthy weight improves rest quality.
- **Overweight individuals** show a gradual decline, hinting at a negative trend between higher BMI and sleep quality.

Category 3: Health, Stress and Activity

5. Which occupation has the highest average daily steps?

```
--- 5. which occupation has highest average daily steps ?
select p.occupation,round(avg(h.Daily_Steps), 2) as avg_steps
from health_info h
join person p on p.person_id=h.person_id
group by p.occupation
order by avg_steps desc;
```

	occupation text	avg_daily_steps numeric
1	Nurse	8057.53
2	Lawyer	7661.70
3	Accountant	6881.08
4	Doctor	6808.45
5	Salesperson	6000.00
6	Engineer	5980.95
7	Teacher	5957.50
8	Software Engineer	5800.00
9	Manager	5500.00
10	Scientist	5350.00
11	Sales Representati...	3000.00

Insights:

- Physically active jobs (Nursing) lead in step count.
- Sales Reps walk least — may travel by vehicle more often.

6. Does a lower heart rate correlate with higher sleep quality among individuals?

```sql
---6. Does a lower heart rate correlate with higher sleep quality among individuals?
select round(avg(heart_rate),2)as avg_hr
from health_info
where person_id in(
 select person_id
 from sleep_details
 where quality_of_sleep>7
);
```

	avg_hr numeric
1	68.05

Insights:

- Good sleepers maintain healthy heart rates (<70 bpm).
- Indicates effective rest and recovery.
- Supports the correlation between rest and cardiovascular health.

7. What are the most and least stressful occupations based on average stress levels?

```sql
---7. What are the most and least stressful occupations based on average stress levels?
with stress_cte as (
    select p.occupation, round(avg(h.stress_level),2) as avg_stress
    from person p
    join health_info h on p.person_id = h.person_id
    group by p.occupation
)
select *, rank() over(order by avg_stress desc) as stress_rank
from stress_cte;
```

	occupation text	avg_stress numeric	stress_rank bigint
1	Sales Representati...	8.00	1
2	Scientist	7.00	2
3	Salesperson	7.00	2
4	Doctor	6.73	4
5	Software Engineer	6.00	5
6	Nurse	5.55	6
7	Lawyer	5.06	7
8	Manager	5.00	8
9	Accountant	4.59	9
10	Teacher	4.53	10
11	Engineer	3.89	11

Insights:

- **Sales-based jobs** dominate top stress levels.
- **Engineers** show lowest average stress.
- Mid-tier stress found in **Doctors and Software Engineers**.

Category 4: Overall Wellness and Risks Assessment

8. Find people with above average heart rate

```sql
--- 8. find people with above average heart rate
select person_id, heart_rate
from health_info
where heart_rate > (select avg(heart_rate) from health_info);
```

	person_id integer	heart_rate integer
1	1	77
2	2	75
3	3	75
4	4	85
5	5	85
6	6	85
7	7	82
8	17	80
9	19	80
10	31	78
11	32	78
12	34	72

Insights:

- 133 out of 374 individuals (~36%) have a heart rate above 70 bpm for cardiovascular monitoring, with peaks at 86 bpm, enabling personalized alerts.
- Informs routine check-ups for elevated rates to prevent stress-related incidents.
- Guides wearable integrations for real-time tracking and early interventions in high-risk groups.

9. Who all are at high risk due to obesity, low sleep or low physical activity?

```
--- 10. who all are at high risk due to obesity,low sleep quality or low physical activity?
select p.Person_id, p.Occupation, h.BMI_Category, s.sleep_duration, h.Physical_activity,
case when h.BMI_category='Obese'
        or s.sleep_duration < 6
        or h.physical_activity < 50 then 'High Risk'
        else 'Low Risk' end as risk_category
from person p
join sleep_details s on p.person_id=s.person_id
join health_info h on s.person_id=h.person_id;
```

	person_id integer	occupation text	bmi_category text	sleep_duration numeric	physical_activity integer	risk_category text
1	1	Software Engineer	Overweight	6.1	42	High Risk
2	2	Doctor	Normal	6.2	60	Low Risk
3	3	Doctor	Normal	6.2	60	Low Risk
4	4	Sales Representati...	Obese	5.9	30	High Risk
5	5	Sales Representati...	Obese	5.9	30	High Risk
6	6	Software Engineer	Obese	5.9	30	High Risk
7	7	Teacher	Obese	6.3	40	High Risk
8	8	Doctor	Normal	7.8	75	Low Risk
9	9	Doctor	Normal	7.8	75	Low Risk
10	10	Doctor	Normal	7.8	75	Low Risk
11	11	Doctor	Normal	6.1	30	High Risk
12	12	Doctor	Normal	7.8	75	Low Risk
13	13	Doctor	Normal	6.1	30	High Risk
14	14	Doctor	Normal	6	30	High Risk
15	15	Doctor	Normal	6	30	High Risk

Insights:

- Most "High Risk" individuals either have **low physical activity (<50)** or **slightly short sleep (<6 hrs)**, even if BMI is normal.
- **Sales Representatives, Software Engineers, and Doctors** appear most frequently in the high-risk list, driven by low activity and sleep deprivation.

10. Which occupations rank highest in overall wellness when combining physical activity, sleep quality, and stress level?

```sql
/* 10. Which occupations rank highest in overall wellness when combining physical activity,
sleep quality, and stress level?*/
with health_cte as (
  select p.occupation,
         round(avg(h.physical_activity),2) as avg_activity,
         round(avg(s.quality_of_sleep),2) as avg_sleep_quality,
         round(avg(h.stress_level),2) as avg_stress
  from person p
  join health_info h on p.person_id = h.person_id
  join sleep_details s on p.person_id = s.person_id
  group by p.occupation
)
select occupation,
       (avg_activity + avg_sleep_quality - avg_stress) as health_score,
       rank() over(order by (avg_activity + avg_sleep_quality - avg_stress) desc) as rank
from health_cte;
```

	occupation text	health_score numeric	rank bigint
1	Nurse	80.41	1
2	Lawyer	73.26	2
3	Accountant	61.41	3
4	Manager	57.00	4
5	Engineer	56.38	5
6	Doctor	55.27	6
7	Software Engineer	48.50	7
8	Teacher	48.08	8
9	Salesperson	44.00	9
10	Scientist	39.00	10
11	Sales Representati...	26.00	11

Insights:

- **Nurses** top overall wellness ranking (high activity + steady sleep).
- **Lawyers** surprisingly rank second — moderate activity but strong balance.
- **Sales Reps** rank last — low activity, high stress, poor sleep.

RECOMMENDATIONS

- Prioritize sleep awareness and flexible work hours for Sales teams.
- Implement stress management sessions for male-heavy departments.
- Focus on mental health workshops for young professionals.
- Introduce office step challenges for low-movement roles.
- Assign work-life balance targets for high-stress roles.
- Monitor 133 elevated heart rate cases with annual screenings and wearables.
- Provide immediate lifestyle coaching and regular monitoring for high risk individuals

CONCLUSION

This SQL-based analysis of the employee health and sleep survey provides deep insights into patterns, risks, and opportunities for intervention across 374 respondents. By normalizing the dataset and executing relational analysis, the project enables the company to shift from assumption-based wellness to data-driven decision-making.

These insights will help optimize programs, resource allocation, and employee support, fostering a healthier, more productive workforce in a demanding professional environment.