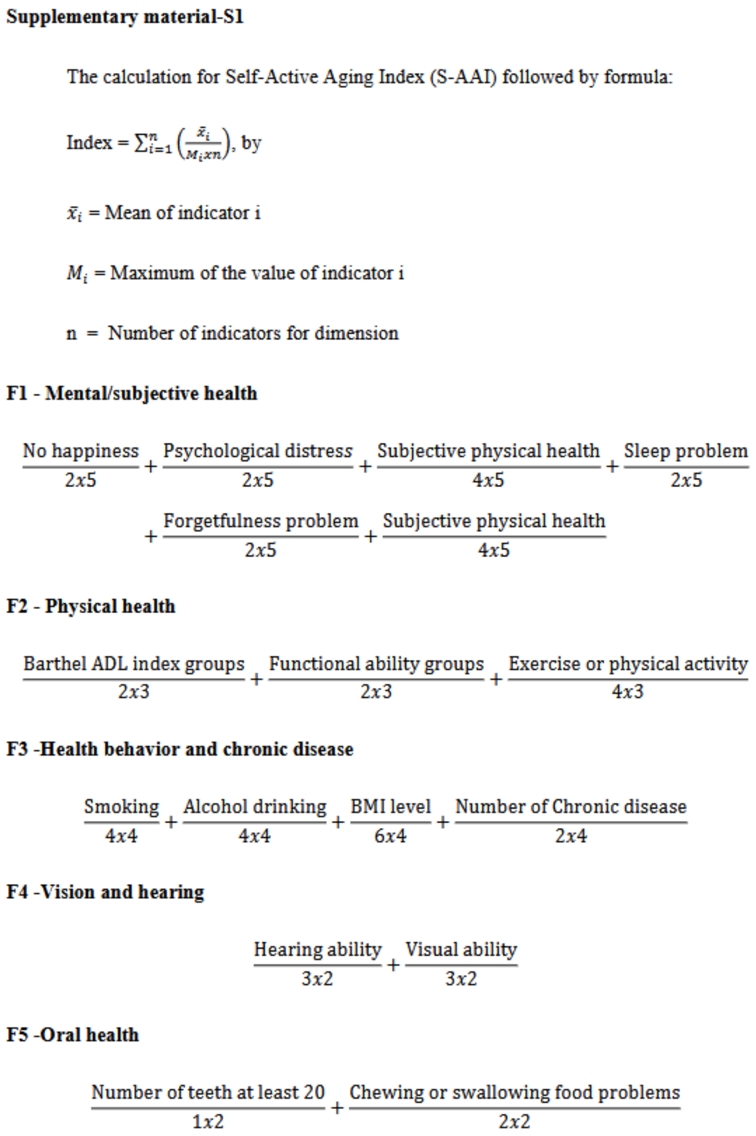
Analysis of 2023 Keeratisiroj Data - Self Active Aging Index (Northern Provinces, Thailand, 2018 data)

- https://www.nature.com/articles/s41598-023-29788-2#Sec15
- Keeratisiroj, O., Kitreerawutiwong, N. & Mekrungrongwong, S. Development of Self-Active Aging Index (S-AAI) among rural elderly in lower northern Thailand classified by age and gender. Sci Rep 13, 2676 (2023). https://doi.org/10.1038/s41598-023-29788-2
- Excel Data source: https://static-content.springer.com/esm/art%3A10.1038%2Fs41598-023-29788-2/MediaObjects/41598_2023_29788_MOESM4_ESM.xlsx



Supplementary material-S1

The calculation for Self-Active Aging Index (S-AAI) followed by formula:

Index = $\sum_{i=1}^{n}\left(\frac{\bar{x}_i}{M_i x n}\right)$, by

$\bar{x}_i$ = Mean of indicator i

M_i = Maximum of the value of indicator i

n = Number of indicators for dimension

F1 - Mental/subjective health

$$\frac{\text{No happiness}}{2x5}+\frac{\text{Psychological distress}}{2x5}+\frac{\text{Subjective physical health}}{4x5}+\frac{\text{Sleep problem}}{2x5}+\frac{\text{Forgetfulness problem}}{2x5}+\frac{\text{Subjective physical health}}{4x5}$$

F2 - Physical health

$$\frac{\text{Barthel ADL index groups}}{2x3}+\frac{\text{Functional ability groups}}{2x3}+\frac{\text{Exercise or physical activity}}{4x3}$$

F3 -Health behavior and chronic disease

$$\frac{\text{Smoking}}{4x4}+\frac{\text{Alcohol drinking}}{4x4}+\frac{\text{BMI level}}{6x4}+\frac{\text{Number of Chronic disease}}{2x4}$$

F4 -Vision and hearing

$$\frac{\text{Hearing ability}}{3x2}+\frac{\text{Visual ability}}{3x2}$$

F5 -Oral health

$$\frac{\text{Number of teeth at least 20}}{1x2}+\frac{\text{Chewing or swallowing food problems}}{2x2}$$

F6 -Social participation

$$\frac{\text{Being a group member or club}}{\mathbf{1}\boldsymbol{x}\mathbf{2}}+\frac{\text{Participation in the activities of the elderly club}}{\mathbf{2}\boldsymbol{x}\mathbf{2}}$$

F7 -Stability in life

$$\frac{\text{Working}}{\mathbf{1}\boldsymbol{x}\mathbf{5}}+\frac{\text{Main source of income}}{\mathbf{4}\boldsymbol{x}\mathbf{5}}+\frac{\text{Debt}}{\mathbf{1}\boldsymbol{x}\mathbf{5}}+\frac{\text{Income level}}{\mathbf{3}\boldsymbol{x}\mathbf{5}}+\frac{\text{Education level}}{\mathbf{6}\boldsymbol{x}\mathbf{5}}$$

F8 -Financial stability

$$\frac{\text{Sufficiency of income}}{\mathbf{2}\boldsymbol{x}\mathbf{3}}+\frac{\text{Saving}}{\mathbf{1}\boldsymbol{x}\mathbf{3}}+\frac{\text{Providing financial support to families}}{\mathbf{2}\boldsymbol{x}\mathbf{3}}$$

F9 -Secure living

$$\frac{\text{Living status}}{\mathbf{2}\boldsymbol{x}\mathbf{2}}+\frac{\text{Housing ownership}}{\mathbf{1}\boldsymbol{x}\mathbf{2}}$$

Total S-AAI score

$$\boldsymbol{S-AAI}=\frac{\boldsymbol{F1+F2+F3+F4+F5+F6+F7+F8+F9}}{\mathbf{9}}$$

In [1]:

```python
import pandas as pd
```

In [73]:

```python
def to_AgeGroup(df, intervals=[5,9,10,90][0], age_col='age'):
    if isinstance(intervals,int):
        bins = {5:[64,69,74,79,84,89,94,99,np.inf],
                9:[64,69,79,89,99,np.inf],
                10:[64,70,80,90,np.inf],
                90:[64,69,74,79,84,89,94,np.inf],
                605:[59,69,74,79,84,89,94,99,np.inf],
                609:[59,69,79,89,99,np.inf],
                6010:[59,70,80,90,np.inf],
                6015:[59,65,70,75,80,85,90,np.inf],
                6090:[59,69,74,79,84,89,94,np.inf],
               }[intervals]
    elif isinstance(intervals,str):
        bins = {'60+':[59,np.inf],
                '70+':[70,np.inf],
                '80+':[80,np.inf],
                '90+':[90,np.inf],
               }[intervals]
    else:
        bins = intervals
    age_labels = [f'{a}-{b}' for a,b in list(zip(bins,bins[1:]))]
    return pd.cut(df[age_col], bins, labels=age_labels)
```

In [79]:

```python
# df = pd.read_excel('../data/2023_Keeratisiroj_Data_41598_2023_29788_MOESM4_ESM (version 1).xlsx')
df = pd.read_excel('https://static-content.springer.com/esm/art%3A10.1038%2Fs41598-023-29788-2/MediaObjects/41598_2023_297
```

In [80]:

```python
columns = ['F1_Raw', 'F2_Raw', 'F3_Raw', 'F4_Raw', 'F5_Raw', 'F6_Raw', 'F7_Raw', 'F8_Raw', 'F9_Raw', 'S_AAI']
```

In [81]:

```python
df['age']
df['AgeGroup'] = to_AgeGroup(df, 6010)
age_cols = []
ag_groups = []
for ag in ['60+','70+','80+','90+']:
    df['AgeGroup_'+ag] = to_AgeGroup(df, ag)
    age_cols += ['AgeGroup_'+ag]
    ag_groups += df['AgeGroup_'+ag].unique().dropna().tolist()
```

In [82]:

```python
def proportions(df, age_cols, ag_groups, cols, col_text, lt_threshold=0.5):
    res = []
    text = []
    for col in cols:
        r = {}
        r['col'] = col_text[col]
        r['col2'] = col
        for a in df['AgeGroup'].unique():
            d = df[(df['AgeGroup']==a)&(df[col]<lt_threshold)][col].count()
            g = df[(df['AgeGroup']==a)][col].count()
            text += [a, col, d,g, round((d/g)*100,2)]
            r[a] = round((d/g)*100,1)
        for (ac,ag) in zip(age_cols,ag_groups):
            d = df[(df[ac]==ag)&(df[col]<lt_threshold)][col].count()
            g = df[(df[ac]==ag)][col].count()
            text += [ag, col, d,g, round((d/g)*100,2)]
            r[ag.replace('-inf','+')] = round((d/g)*100,1)
        res += [r]
    return pd.DataFrame.from_records(res).T.sort_index().T.set_index('col'), text

lt_threshold = 0.5
cols = ['S_AAI']+[f'F{i+1}_Raw' for i in range(9)]
col_text = {k:v for k,v in zip(cols, [c+f' below {int(lt_threshold*100)}%' for c in ['Self-Active Aging Index (S-AAI)',
                                                             'Mental/Subjective health',
                                                             'Physical health',
                                                             'Health behavior/chronic disease',
                                                             'Vision and hearing',
                                                             'Oral health',
                                                             'Social participation',
                                                             'Stability in life',
                                                             'Financial stability ',
                                                             'Secure living']])}


dfr, text_list = proportions(df, age_cols, ag_groups, cols, col_text)
dfr.drop(['90-inf','col2'],axis=1)
```

Out[82]:

col	59+	59-70	70+	70-80	80+	80-90	90+
Self-Active Aging Index (S-AAI) below 50%	6.3	3.6	9.4	7.1	15.0	15.4	9.1
Mental/Subjective health below 50%	23.0	21.5	24.9	22.8	29.9	30.1	27.3
Physical health below 50%	7.7	3.7	12.1	8.0	22.4	22.1	27.3
Health behavior/chronic disease below 50%	6.0	8.0	3.7	4.1	2.7	2.9	0.0
Vision and hearing below 50%	11.1	12.4	9.6	9.9	8.8	8.8	9.1
Oral health below 50%	37.9	26.6	50.9	45.6	63.9	64.7	54.5
Social participation below 50%	35.6	31.2	40.7	37.9	47.6	48.5	36.4
Stability in life below 50%	57.5	76.3	35.8	44.2	15.0	15.4	9.1
Financial stability below 50%	45.3	39.9	51.5	52.2	49.7	51.5	27.3
Secure living below 50%	5.8	3.6	8.4	6.9	12.2	11.8	18.2

ADL Grouping Proportions:

In [106…

```
dfg = df[['age','health4_ADLgr']].groupby(by=['health4_ADLgr']).count()
dfg['%'] = ((dfg['age']/len(df))*100).round(2)
dfg
```

Out[106…

health4_ADLgr	age	%
1	8	0.73
2	20	1.82
3	1070	97.45

Demographic Proportions:

In [109…

```
a = df['age']; g = df['gender']
'Age', a.mean(), a.std(), UtilStats.CI.bootstrap_ci(a), 'Gender', g.mean(), g.std(), UtilStats.CI.bootstrap_ci(g)
```

Out[109…

```
('Age',
 71.01092896174863,
 7.548196332181049,
 (70.56102003642987, 71.39890710382514),
 'Gender',
 1.6138433515482695,
 0.48708907937422713,
 (1.5819672131147542, 1.6429872495446265))
```