```sas
/*
    Microolastic Intake Analysis
    by Vallesia Pierre Louis
*/

FILENAME REFFILE '/home/u64201497/vallesia/processed_microplastics_clean.csv';

proc import DATAFILE=REFFILE
    DBMS=CSV
    OUT=work.microplastics;
    GETNAMES=YES;

run;

proc contents DATA=work.microplastics;
run;

title"Missing Value and Outlier Check";

proc means data=microplastics n nmiss min max mean std;
    var total_ug_per_kg;
run;

proc univariate data=microplastics;
    var total_ug_per_kg;
    histogram total_ug_per_kg / normal;
    inset mean std median min max / position=ne;
run;

title "Average intake overtime(1990- 2018)";
proc sql;
    select year,
           mean(total_ug_per_kg) as avg_total_intake
    from microplastics
    group by year
    order by year;
quit;

title "Average Global Intake Over Time";
proc sgplot data=microplastics;
    vline year / response=total_ug_per_kg stat=mean;
    yaxis label="Average Intake (ug/kg)";
    xaxis label="Year";
run;


title "Top 10 Countries by Microplastic Intake in 2018";

proc sql outobs=10;
    select country, total_ug_per_kg
    from microplastics
    where year = 2018
    order by total_ug_per_kg desc;
quit;

proc sql outobs=10;
    create table top10_2018 as
    select country, total_ug_per_kg
    from microplastics
    where year = 2018
    order by total_ug_per_kg desc;
quit;
```

```
65
66  proc sgplot data=top10_2018;
67      hbar country / response=total_ug_per_kg datalabel;
68      xaxis label="Microplastic Intake (ug/kg)";
69  run;
70
71
72  title "Percent Change in Microplastic Intake (1990 vs. 2018)";
73
74  proc sql;
75      create table percentage as
76      select country,
77             max(case when year = 1990 then total_ug_per_kg end) as intake_1990,
78             max(case when year = 2018 then total_ug_per_kg end) as intake_2018
79      from microplastics
80      group by country;
81  quit;
82
83
84
85  title "Percent Change in Microplastic Intake (1990 vs. 2018)";
86  proc sql;
87      select
88          country,
89          intake_1990,
90          intake_2018,
91          (intake_2018 - intake_1990) as absolute_change,
92          ((intake_2018 - intake_1990) / intake_1990) * 100 as percent_change format=8.1
93      from percentage
94      where intake_1990 is not null and intake_2018 is not null
95      order by percent_change desc;
96  quit;
97
98
99  title "Countries with Greatest Reductions";
100 proc sql;
101     create table reduction as
102     select country,
103            max(case when year = 1990 then total_ug_per_kg end) as intake_1990,
104            max(case when year = 2018 then total_ug_per_kg end) as intake_2018
105     from microplastics
106     group by country;
107 quit;
108
109
110
111
112 proc sql outobs=10;
113     select country, intake_1990, intake_2018,
114            (intake_2018 - intake_1990) as absolute_change,
115            round(((intake_2018 - intake_1990) / intake_1990) * 100, 1) as percent_change
116     from reduction
117     where intake_1990 is not null and intake_2018 is not null and intake_2018 < intake_1990
118     order by percent_change;
119 quit;
120
121
122 title"Trend Slope by Country ";
123
124 proc sort data=microplastics;
125     by country year;
126 run;
127
128
129 proc reg data=microplastics outest=slopes;
```

```
    by country;
    model total_ug_per_kg = year;
run;
quit;


proc sql;
    create table top10_2018 as
    select country
    from microplastics
    where year = 2018
    order by total_ug_per_kg desc
    outobs=10;
quit;


proc sql;
    create table long_format_top10 as
    select m.country, m.year, 'cheese' as category, m.cheese as intake
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'yoghurt', m.yoghurt
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'fish', m.fish
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'shellfish', m.shellfish
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'eggs', m.eggs
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'refined_grains', m.refined_grains
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'beans_and_legumes', m.beans_and_legumes
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'non_starchy_vegetables', m.'non-starchy_vegetables'n
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'fruits', m.fruits
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'nuts_and_seeds', m.nuts_and_seeds
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'other_starchy_vegetables', m.other_starchy_vegetables
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'potatoes', m.potatoes
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'total_milk', m.total_milk
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'total_processed_meats', m.total_processed_meats
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'total_salt', m.total_salt
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

```

```
    union all select m.country, m.year, 'unprocessed_red_meats', m.unprocessed_red_meats
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'whole_grains', m.whole_grains
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018

    union all select m.country, m.year, 'added_sugars', m.added_sugars
    from microplastics m inner join top10_2018 t on m.country = t.country where m.year = 2018;
quit;

title "Top 10 Countries' Microplastic Intake by Food Category for 2018";
```