# Koronca6

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[1]:
```
import numpy as np
import seaborn as sns
import math
import matplotlib.pyplot as plt
from matplotlib import cm
import scipy.optimize
import pandas as pd
```

[2]:
```
%config InlineBackend.figure_format = 'retina'
```

[3]:
```
sns.set("paper")
sns.set()
sns.set_style("whitegrid")
sns.set_style("whitegrid", {"axes.facecolor": ".995",
                            'axes.spines.left': False,
                            'axes.spines.top': False,
                            'axes.spines.right': False,
                            'axes.edgecolor': '.5',
                            'axes.grid': True,
                            'grid.color': '.85'})

plt.rcParams["figure.figsize"] = [6.4, 4.8]

plt.rcParams["lines.linewidth"] = 2

plt.rcParams["lines.marker"] = "o"
plt.rcParams["lines.markeredgecolor"] = "w"
plt.rcParams["lines.markeredgewidth"] = "2"
plt.rcParams["lines.markersize"] = 6
palette = "Blues_d"

plt.rcParams['figure.dpi'] = 100

blues_d = cm.Blues(np.linspace(.3, 1, 5))
blues_dd = cm.Blues(np.linspace(.3, 1, 5))
```

```
cmap = np.concatenate((cm.Blues(np.linspace(0.3, 1, 5))[:,:3], 0.3 +  cm.
 ↪plasma(np.linspace(0.15, 1, 7))[:,:3]*0.7))
cm_stran = cmap[[4, 2, 0, 5,6,7,8,9,10,11, 1, 3]]
cmap = cmap[[4, 3, 2, 1, 0, 5,6,7,8,9,10,11]]

save_dpi=150
cur_img = 0
```

[4]:
```
def utils_plot1(ax, log, title, ylim, xticks):
    if xticks is not None:
        ax.set_xticks(xticks)
    ax.set_title(title + (" [log]" if log else ""))
    ax.set_ylim(0 if (ylim==None and not log) else (0.95 if ylim==None else␣
 ↪ylim))
    ax.set_yscale("log" if log else "linear")
    ax.xaxis.set_tick_params(labelbottom=True)
    plt.subplots_adjust(wspace=0.13, top=0.91, left=.06, right=.93, bottom=.08)
    ax.set(xlabel=None)
    if log:
        ax.grid(axis="y", which="both")

def plot_bar_m1(ax, x, y, log=False, title=None, ylim=None, xticks=None,␣
 ↪x2=None, y2=None, width=(0.6, 0.5, 0.1), show=True, x3=None, y3=None):
    if not x2 is None and not y2 is None:
        ax.bar(x2, y2, color="lightblue", width=(width[1] if len(width)>1 else␣
 ↪width[0]))
    if len(x) and len(y):
        ax.bar(x, y, color="b", width=width[0])
    if x3 is not None and y3 is not None:
        ax.bar(x3, y3, width=(width[2] if len(width)>2 else width[0]), color=".
 ↪25", alpha=.7, linewidth=0)

    utils_plot1(ax, log, title, ylim, xticks)

def plot_line1(ax, x, y, log=False, title=None, ylim=None, xticks=None,␣
 ↪x2=None, y2=None, m2=True, show=True, color=None):
    if x2 is not None and y2 is not None:
        sns.lineplot(x2, y2, color=("lightblue" if m2 else "orange"),␣
 ↪marker=(plt.rcParams["lines.marker"] if m2 else ""), ax=ax)
    if len(x) and len(y):
        sns.lineplot(x, y, color=("b" if not color else color), ax=ax)

    utils_plot1(ax, log, title, ylim, xticks)

def plot_bar1(ax, x, y, log=False, title=None, ylim=None, xticks=None, x2=None,␣
 ↪y2=None):
```

```
    if not x2 is None and not y2 is None:
        sns.lineplot(x2, y2, color="orange", marker="", ax=ax)
    if len(x) and len(y):
        ax.bar(x, y, color="b", width=0.7)

    utils_plot1(ax, log, title, ylim, xticks)
```

[5]:
```
def cat(l):
    return np.concatenate(l)

def reverse_legend(ax, labels1=None):
    handles, labels = ax.get_legend_handles_labels()
    if labels1 is None:
        ax.legend(handles[::-1], labels[::-1])
    else:
        ax.legend(handles[::-1], labels1[::-1])
```

---

# 1 Podatki

Vir 1: NIJZ *[Spremljanje koronavirusa SARS-CoV-2 (COVID-19)]*
Vir 2: prirejeno po NIJZ: *[Dnevno spremljanje okužb s SARS-CoV-2 (COVID-19) [graf]]*
Vir 3: Objave vlade na gov.si in twitterju.
*Vir 4: Luka Renko et al., COVID-19 Slovenija*

Na grafih je *vir 2* temno moder, *vir 1* svetlo moder, *vir 3* pa siv.

- pri *vir 1* so podatki na začetku za ob 14h, od dneva 11 naprej ob ~10-14h na določen dan, zato so na grafu zamaknjeni za 0.5 dneva v levo
- pri *vir 2* so podatki na začetku za konec dneva, od dneva 15 naprej naslednji dan ob 10h
- pri *vir 3* ni točno zabeleženo, na katero obdobje se podatki nanašajo, objavljeno enkrat popoldne
- *vir 4* samo za hospitalizacije ipd. (neuradno!), in po regijah ter starostirh (uradno, posredno iz *vir 2*)

Dan 1 je *4.3.*, zadnjič posodobljeno *25.3.* (zadnji celodnevni podatek velja za en dan nazaj).

**Dodatne informacije *(vir 3)***

[6]:
```
podatki_ekstra = [
    [9, 9, 5],  # za primerjavo v poznejših grafih
    [15, 36, 6], #20h, 8740testov, 286poz = 14h
    [16, 45, 6], #21h
    [17, 55, 9, 1046, 28], #17h +1046test +28poz
    [18, 56, 9, 1482, 44],  #14h 385poz (2+kot nijz)
    [19, 55, 10, 1088, 46], #14h
    [20, 64, 10, 714, 28], # 15h
    [21, 65, 10, 1058, 36],
    [22, 72, 14, 1243, 50]
]
skupaj_umrli = [0,0,0,0,0,0,0,0,0,0,1,1,1,1,1,1,1,2,3,4, 4] #zadnji d20

dni_ekstra = np.array([1] + [d[0] for d in podatki_ekstra])
hospitalizirani = np.array([0] + [d[1] for d in podatki_ekstra])
intenzivni = np.array([0] + [d[2] for d in podatki_ekstra])

dni_ekstra2 = np.array([d[0] for d in podatki_ekstra if len(d)>3])
novi_ekstra = np.array([d[4] for d in podatki_ekstra if len(d)>3])
novi_testi_ekstra = np.array([d[3] for d in podatki_ekstra if len(d)>3])
```

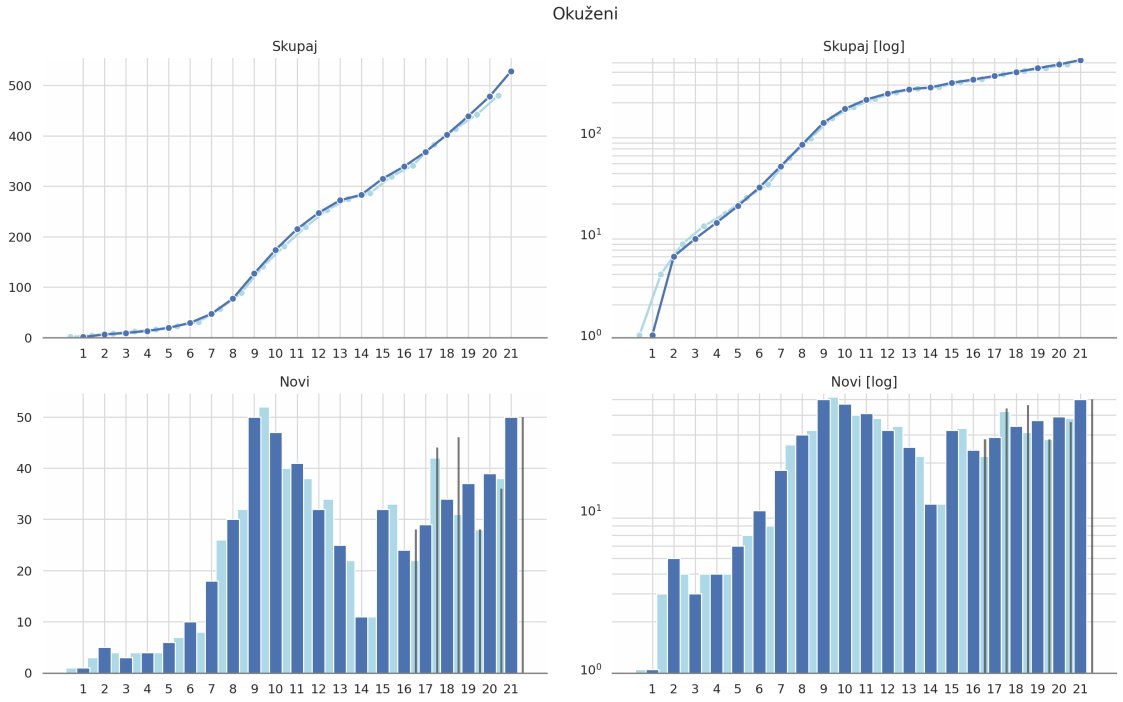
### 1.1 Podatki o okuženih

[7]:
```
podatki_okuzeni = [
 [1, 1, 1],
 [2, 4, 6],
 [3, 8, 9],
 [4, 12, 13],
 [5, 16, 19],
 [6, 23, 29],
 [7, 31, 47],
 [8, 57, 77],
 [9, 89, 127],
 [10, 141, 174],
 [11, 181, 215],
 [12, 219, 247],
 [13, 253, 272],
 [14, 275, 283],
 [15, 286, 315, 317],
 [16, 319, 339, 341],
 [17, 341, 368, 379],
 [18, 383, 402, 412], # ali s=385 (tw, 17h)
 [19, 414, 439, 440],
 [20, 442, 478],
 [21, 480, 528],
 [22, -1, -1]]

#vir1 - Na začetku ob 14h, od dneva 11 naprej ob ~10h
dniS = np.array([d[0] for d in podatki_okuzeni if d[0] < 22])
dniS1 = np.array([d[0] for d in podatki_okuzeni if d[0] < 21])
okuzeniS = np.array([d[1] for d in podatki_okuzeni if d[0] < 22])
okuzeniS1 = np.array([d[1] for d in podatki_okuzeni if d[0] < 21])

#vir2 - Konec dneva, od dneva 15 naprej naslednji dan ob 10h
dni = np.array([d[0] for d in podatki_okuzeni[:-1]])
okuzeni = np.array([d[2] for d in podatki_okuzeni[:-1]])
```

[8]:
```
novi = np.array([okuzeni[0]] + [okuzeni[i+1] - okuzeni[i] for i in␣
 ↪range(okuzeni.shape[0] - 1)])
noviS = np.array([okuzeniS[0]] + [okuzeniS[i+1] - okuzeniS[i] for i in␣
 ↪range(okuzeniS.shape[0] - 1)])
noviS1 = np.array([okuzeniS1[0]] + [okuzeniS1[i+1] - okuzeniS1[i] for i in␣
 ↪range(okuzeniS1.shape[0] - 1)])
```

[45]:
```
fig, ((ax1, ax2), (ax3, ax4)) = plt.subplots(nrows=2, ncols=2, figsize=(15, 9),␣
 ↪sharex="all")
fig.suptitle("Okuženi")
plot_line1(ax1, dni, okuzeni, False, "Skupaj", xticks=dni,
```

```
          x2=dniS - 0.6, y2=okuzeniS)
plot_line1(ax2, dni, okuzeni, True, "Skupaj", xticks=dni,
          x2=dniS - 0.6, y2=okuzeniS)

plot_bar_m1(ax3, dni, novi, False, "Novi", xticks=dni,
          x2=dniS - .55, y2=noviS, x3=dni_ekstra2-.45, y3=novi_ekstra)
plot_bar_m1(ax4, dni, novi, True, "Novi", xticks=dni,
          x2=dniS - .55, y2=noviS, x3=dni_ekstra2-.45, y3=novi_ekstra)
```

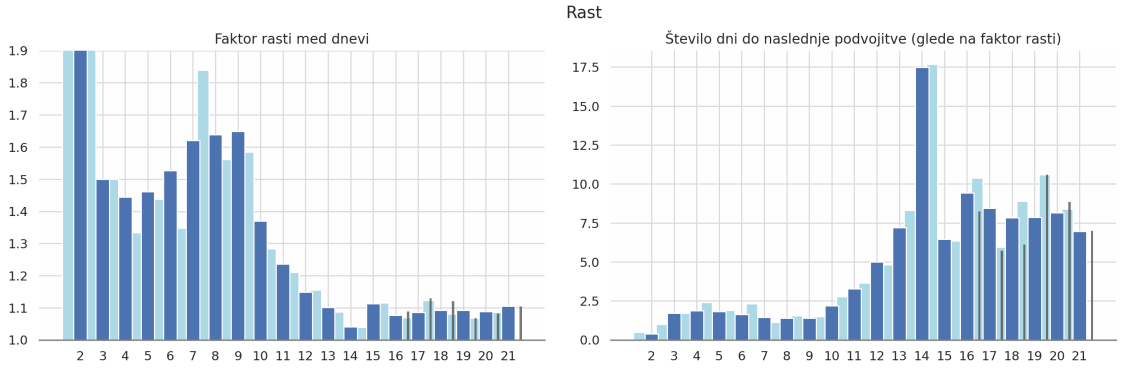



## 1.2 Rast

[10]:
```
rast = np.array([okuzeni[i+1]/okuzeni[i] for i in range(okuzeni.shape[0] - 1)])
podvojitev = math.log(2)/np.log(rast)

rastS = np.array([okuzeniS[i+1]/okuzeniS[i] for i in range(okuzeniS.shape[0] -␣
↪1)])
podvojitevS = math.log(2)/np.log(rastS)


dbl_d2 = math.log(2)/math.log(np.average(rast[-2:]))
dbl_d1 = math.log(2)/math.log(rast[-1])
```

[11]:
```
rast_ekstra = 1+ novi_ekstra/okuzeniS[dni_ekstra2-1-1] # vir 3
podvojitev_ekstra = math.log(2)/np.log(rast_ekstra)
```

[12]:
```
fig, (ax1, ax2) = plt.subplots(nrows=1, ncols=2, figsize=(15, 5), sharex=True)
fig.suptitle("Rast", y=0.96)
plot_bar_m1(ax1, dni[1:], rast, False, "Faktor rasti med dnevi", ylim=(1,1.9),
          x2=dniS[1:] - .55, y2=rastS, x3=dni_ekstra2-.45, y3=rast_ekstra,␣
 ↪xticks=dni[1::])
plot_bar_m1(ax2, dni[1:], podvojitev, False,
           "Število dni do naslednje podvojitve (glede na faktor rasti)",
          x2=dniS[1:] - .55, y2=podvojitevS, x3=dni_ekstra2-.45,␣
 ↪y3=podvojitev_ekstra, xticks=dni[1::])
plt.subplots_adjust(top=0.85, bottom=.15)
```




### 1.3 Podatki o testih

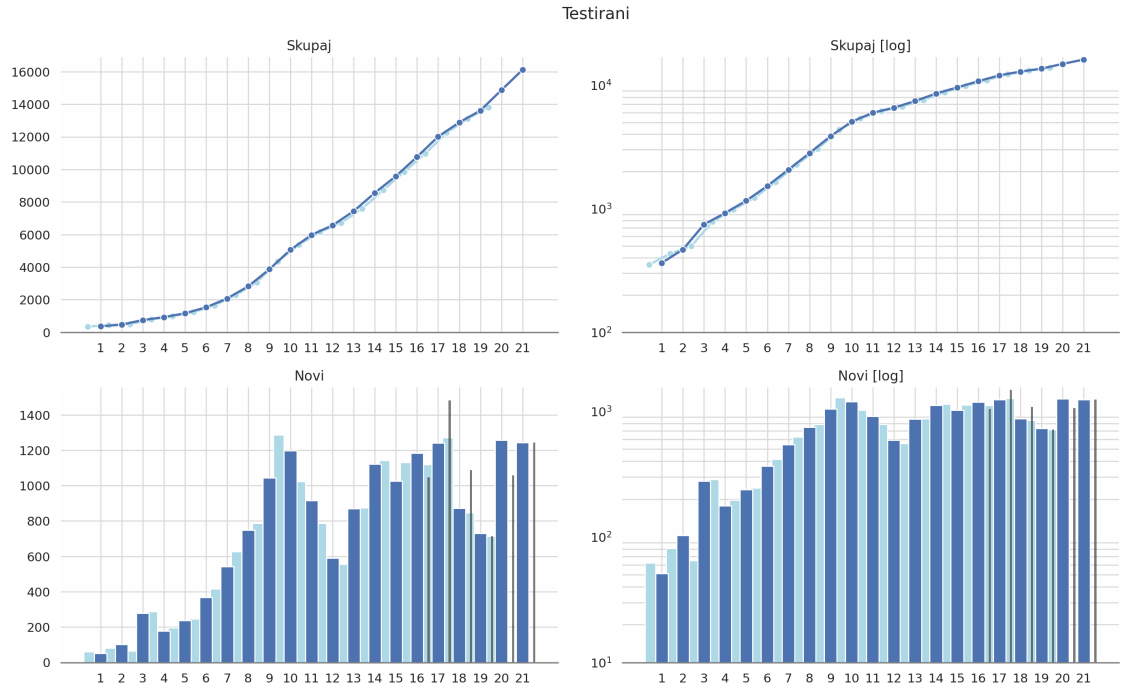
[13]:
```
diff = 313 # št. testiranih pred dnem 1
podatki_testirani = [
 [-3, 183, 183],
 [-2, 208, 208],
 [-1, 255, 255],
 [0, 290, 313],
 [1, 352, 364],
 [2, 433, 467],
 [3, 498, 745],
 [4, 785, 922],
 [5, 981, 1160],
 [6, 1227, 1527],
 [7, 1643, 2069],
 [8, 2270, 2818],
 [9, 3058, 3863],
 [10, 4346, 5060],
```

```
 [11, 5369, 5976],
 [12, 6156, 6566],
 [13, 6712, 7437],
 [14, 7587, 8558],
 [15, 8730, 9584],
 [16, 9860, 10768], #10732
 [17, 10980, 12010], #11940
 [18, 12250, 12882],
 [19, 13098, 13613],
 [20, 13812, 14870],
 [21, -1, 16113],
 [22, -1, -1]]

#Ker v tej tabeli desni stolpec pomeni okužbe ob koncu dneva in ne naslednji␣
 ↪dan ob 10h kot za okužene
# za računanje razmerij med okuženimi in testi uporabljam namesto zadnje␣
 ↪vrednosti v njem spodnjo
#drugacen_zadnji_testi = 12162
testirani_drug_z = np.array([d[2] for d in podatki_testirani[:-1]])

#vir1 - Na začetku ob 14h, od dneva 11 naprej enkrat med 10h in 14h. Nekateri␣
 ↪dnevi manjkajo
dni_testS = np.array([d[0] for d in podatki_testirani if d[1]>0])
testiraniS = np.array([d[1] for d in podatki_testirani if d[1]>0])

#vir2 - Konec dneva, zadnji dan vključuje še teste naslednjega dne do enkrat␣
 ↪med 10h in 14h
dni_test = np.array([d[0] for d in podatki_testirani[:-1]])
testirani = np.array([d[2] for d in podatki_testirani[:-1]])

#d = [[dni_testS[i], testiraniS[i]] for i in range(len(dni_testS))]
```

[14]:
```
novi_testi = np.array([(testirani[i+1] - testirani[i])/(dni_test[i+1] -␣
 ↪dni_test[i])
                       for i in range(dni_test.shape[0] - 1)])
novi_testi_drug_z = np.array([(testirani_drug_z[i+1] - testirani_drug_z[i])/
 ↪(dni_test[i+1] - dni_test[i])
                       for i in range(dni_test.shape[0] - 1)])

novi_testiS = np.array([(testiraniS[i+1] - testiraniS[i])/(dni_testS[i+1] -␣
 ↪dni_testS[i])
                       for i in range(dni_testS.shape[0] - 1)])
```

[44]:
```
fig, ((ax1, ax2), (ax3, ax4)) = plt.subplots(nrows=2, ncols=2, figsize=(15, 9),␣
 ↪sharex=True)
fig.suptitle("Testirani")
```

```
plot_line1(ax1, dni_test[4:], testirani[4:], False, "Skupaj", xticks=dni,
          x2=dni_testS[4:] - 0.6, y2=testiraniS[4:])
plot_line1(ax2, dni_test[4:], testirani[4:], True, "Skupaj", xticks=dni,
          x2=dni_testS[4:] - 0.6, y2=testiraniS[4:], ylim=100)

plot_bar_m1(ax3, dni_test[4:], novi_testi[3:], False, "Novi", xticks=dni,
          x2=dni_testS[4:] - .55, y2=novi_testiS[3:], x3=dni_ekstra2-.45,␣
 ↪y3=novi_testi_ekstra)
plot_bar_m1(ax4, dni_test[4:], novi_testi[3:], True, "Novi", xticks=dni,
          x2=dni_testS[4:] - .55, y2=novi_testiS[3:], x3=dni_ekstra2-.45,␣
 ↪y3=novi_testi_ekstra, ylim=10)
```



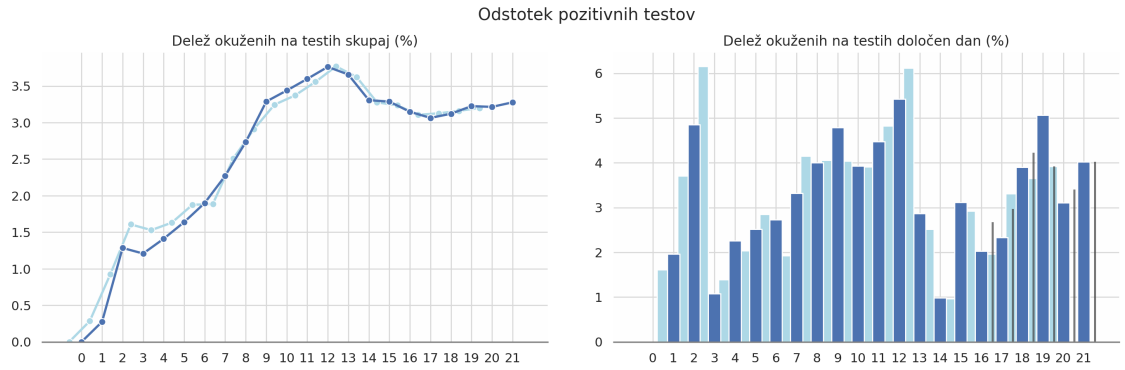

## 1.4 Razmerja med testi in okuženimi

[16]:
```
dni_odstotek = np.array([i for i in dni_test if i >= 0])

# Odstotek pozitivnih skupaj in za posamezen dan
odstotek_poz = np.insert(okuzeni/testirani[4:], 0, 0)
odstotek_poz_novi =  np.insert(novi/novi_testi_drug_z[3:], 0, 0)

# Testi na posameznega okuženega
testi_na_okuzenega =testirani_drug_z[4:]/okuzeni
novi_testi_na_okuzenega = novi_testi_drug_z[3:]/okuzeni
```

```
novi_testi_na_novega = novi_testi_drug_z[3:]/novi


dni_odstotekS = np.array([i for i in dni_testS if i >= 0 and i < 21])

odstotek_pozS = np.insert(okuzeniS1/testiraniS[4:], 0, 0)
odstotek_poz_noviS = np.insert(noviS1/novi_testiS[3:], 0, 0)

testi_na_okuzenegaS =testiraniS[4:]/okuzeniS1
novi_testi_na_okuzenegaS = novi_testiS[3:]/okuzeniS1
novi_testi_na_novegaS = novi_testiS[3:]/noviS1
```

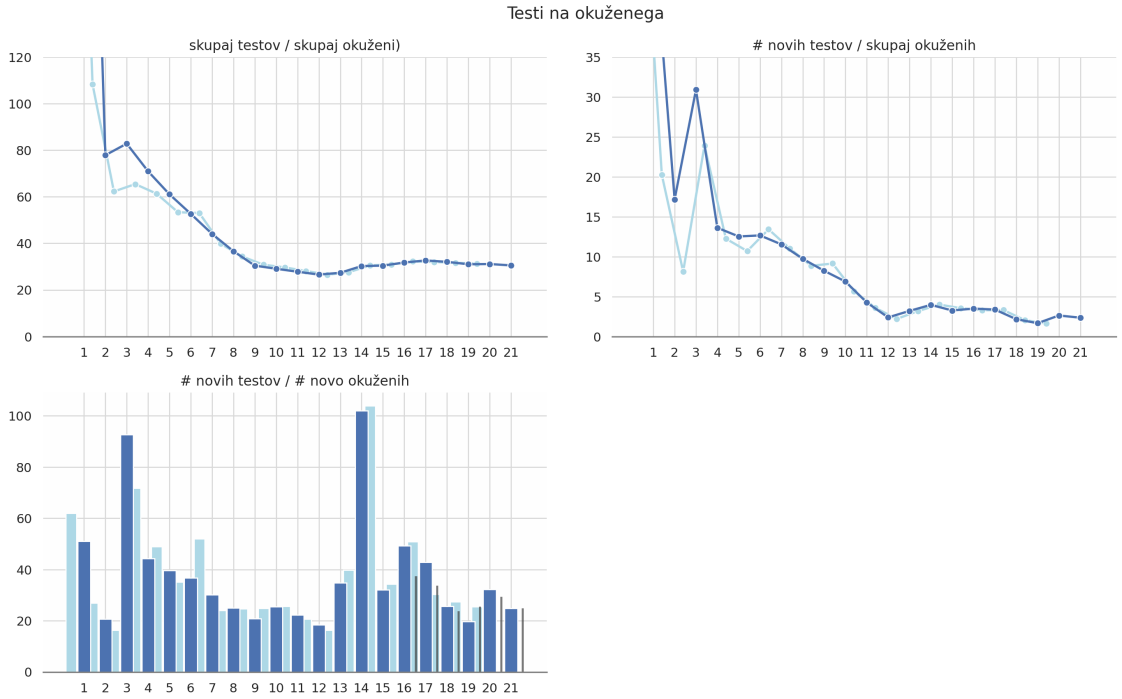
[17]:
```
odstotek_poz_novi_ekstra = novi_ekstra/novi_testi_ekstra # vir 3
novi_testi_na_novega_ekstra = novi_testi_ekstra/novi_ekstra
```

[18]:
```
fig, (ax1, ax2) = plt.subplots(nrows=1, ncols=2, figsize=(15, 5), sharex=True)
fig.suptitle("Odstotek pozitivnih testov", y=0.96)
plot_line1(ax1, dni_odstotek, odstotek_poz*100, False, "Delež okuženih na␣
↪testih skupaj (%)", xticks=dni_odstotek,
          x2=dni_odstotekS - 0.6, y2=odstotek_pozS*100)
plot_bar_m1(ax2, dni_odstotek[:], odstotek_poz_novi*100, False, "Delež okuženih␣
↪na testih določen dan (%)", xticks=dni_odstotek,
          x2=dni_odstotekS[:] - .55, y2=odstotek_poz_noviS*100, x3=dni_ekstra2-.
↪45, y3=odstotek_poz_novi_ekstra*100)
plt.subplots_adjust(top=0.85, bottom=.15)
```




[43]:
```
fig, ((ax1, ax2), (ax3, ax4)) = plt.subplots(nrows=2, ncols=2, figsize=(15, 9),␣
↪sharex=True)
fig.suptitle("Testi na okuženega")
plot_line1(ax1, dni, testi_na_okuzenega, False, "skupaj testov / skupaj␣
↪okuženi)",
          x2=dniS1 - 0.6, y2=testi_na_okuzenegaS, ylim=(0, 120), xticks=dni)
```

```
plot_bar_m1(ax3, dni, novi_testi_na_novega, False, "# novih testov / # novo␣
↪okuženih",
       x2=dniS1 - 0.6, y2=novi_testi_na_novegaS, x3=dni_ekstra2-.45,␣
↪y3=novi_testi_na_novega_ekstra, xticks=dni)
plot_line1(ax2, dni, novi_testi_na_okuzenega, False, "# novih testov / skupaj␣
↪okuženih",
         x2=dniS1 - 0.6, y2=novi_testi_na_okuzenegaS, ylim=(0, 35), xticks=dni)
ax4.remove()
```




## 1.5 Hospitalizacije, regije in starost *(vir 4)*

[20]:
```
d4 = pd.read_csv("./slo_covid.csv")
d4 = d4.set_index("day")
```

### 1.5.1 Hospitalizacije

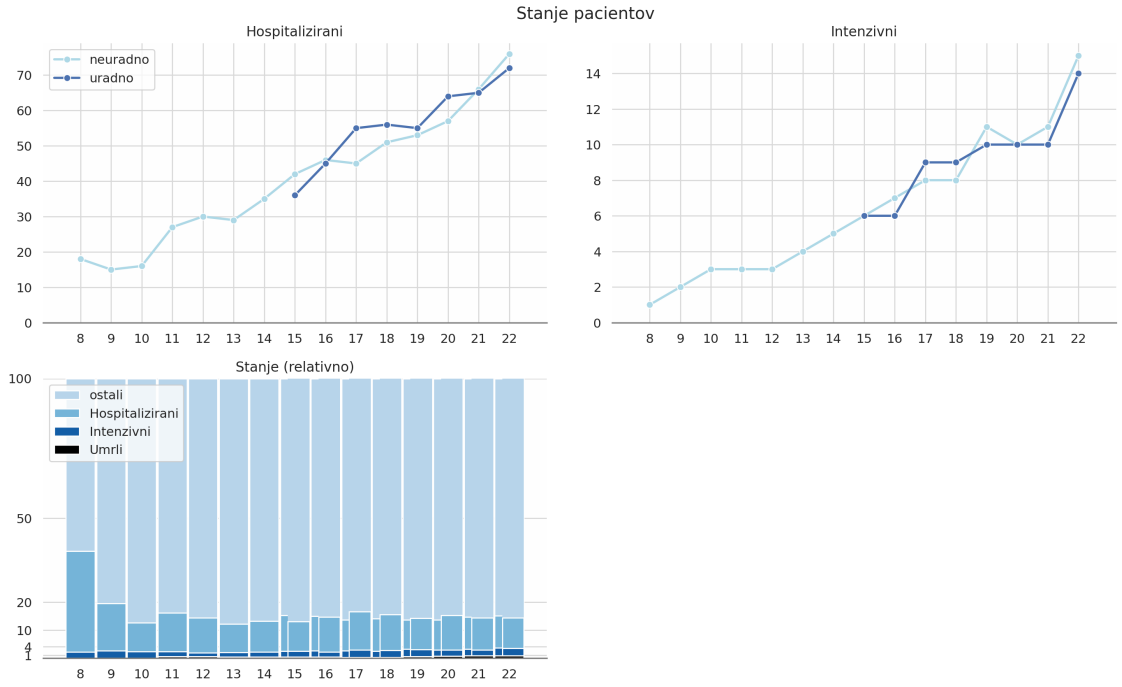
[21]:
```
# Hospitalizacije
def get_col(key, d=d4):
    values = d[key][d[key].notna()].to_numpy()
    days = d[key][d[key].notna()].index.to_numpy()
    return (days, values)
```

```
hospit4 = get_col("state.in_hospital")
intenz4 = get_col("state.icu")
dni_hospit = cat(([1], hospit4[0]))
hospit4 = cat(([0], hospit4[1]))
intenz4 = cat(([0], intenz4[1]))

hospit4_rel = hospit4[1:]/okuzeni[6:]
intenz4_rel = intenz4[1:]/okuzeni[6:]
```

[22]:
```
#vir 3
'''
skupaj_umrli_rel = skupaj_umrli/okuzeniS
hospitalizirani_rel = hospitalizirani[2:]/okuzeniS[14:]
intenzivni_rel = intenzivni[2:]/okuzeniS[14:]
'''
skupaj_umrli_rel = skupaj_umrli[1:]/okuzeni
hospitalizirani_rel = hospitalizirani[2:]/okuzeni[13:]
intenzivni_rel = intenzivni[2:]/okuzeni[13:]
```

[23]:
```
fig, ((ax1, ax2), (ax3, ax4)) = plt.subplots(nrows=2, ncols=2, figsize=(15, 9),␣
↪sharex=True)
fig.suptitle("Stanje pacientov", y=0.96)
plot_line1(ax1, dni_ekstra[2:], hospitalizirani[2:], False, "Hospitalizirani",␣
↪xticks=dni_hospit[1:],
          x2=dni_hospit[1:], y2=hospit4[1:])
plot_line1(ax2, dni_ekstra[2:], intenzivni[2:], False, "Intenzivni",␣
↪xticks=dni_hospit[1:],
          x2=dni_hospit[1:], y2=intenz4[1:])

ax1.legend(["neuradno", "uradno"])

ax3.bar(x=dni_hospit[1:], height=100, width=.95, color=blues_d[0])
ax3.bar(x=dni_hospit[1:], height=hospit4_rel*100, bottom=skupaj_umrli_rel[6:
↪]*100, width=.95, color=blues_d[1])
ax3.bar(x=dni_hospit[1:], height=intenz4_rel*100, bottom=skupaj_umrli_rel[6:
↪]*100, width=.95, color=blues_d[3])
ax3.bar(x=dni_hospit[1:], height=skupaj_umrli_rel[6:]*100, width=.95,␣
↪color=[0,0,0])
off = .125
w=.7
ax3.bar(x=dni_ekstra[2:]+off, height=100, width=w, color=blues_d[0],␣
↪linewidth=0)
ax3.bar(x=dni_ekstra[2:]+off, height=hospitalizirani_rel*100,␣
↪bottom=skupaj_umrli_rel[13:]*100, width=w, color=blues_d[1])
```

```
ax3.bar(x=dni_ekstra[2:]+off, height=intenzivni_rel*100,␣
 ↪bottom=skupaj_umrli_rel[13:]*100, width=w, color=blues_d[3])
ax3.bar(x=dni_hospit[1:], height=skupaj_umrli_rel[6:]*100, width=.95,␣
 ↪color=[0,0,0])


utils_plot1(ax3, False, "Stanje (relativno)", (0,100), dni_hospit[1:])
ax3.legend(["ostali", "Hospitalizirani", "Intenzivni", "Umrli"])
ax3.set_yticks([1,4,10,20, 50, 100])
ax4.remove()
```

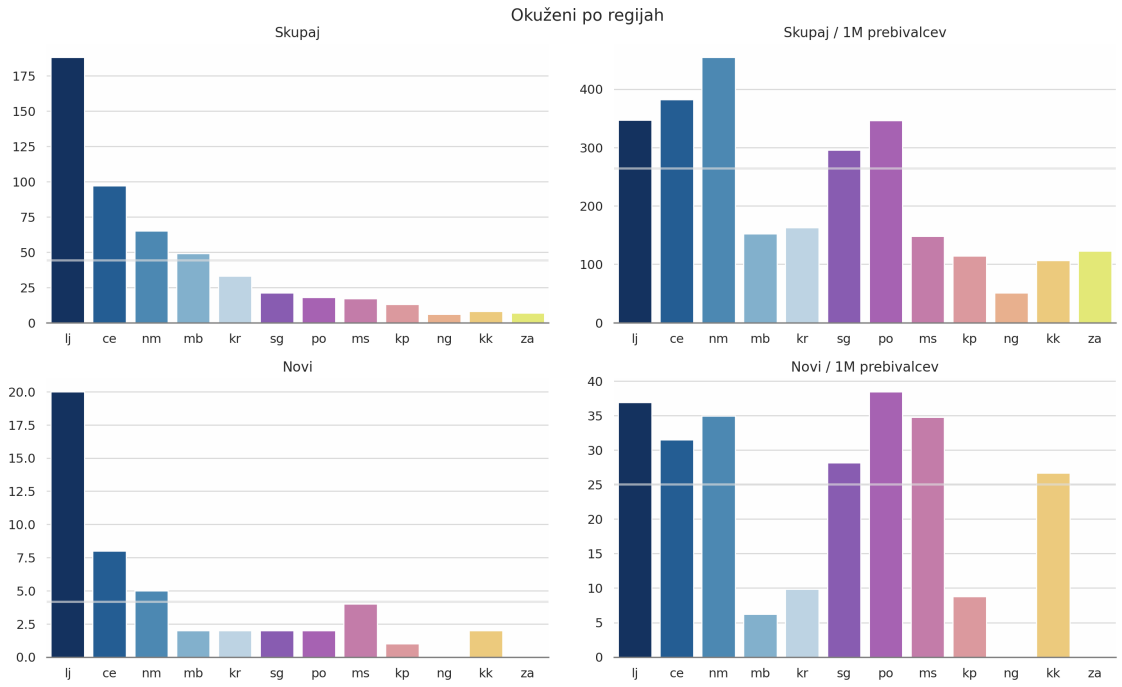



### 1.5.2 Regije

[24]:
```
# Regije
regije_populacija = np.array([542, 254, 143, 322, 203, 71, 52, 115, 114, 117,␣
 ↪75, 57])/1000
regije = ["lj", "ce", "nm", "mb", "kr", "sg", "po", "ms", "kp", "ng", "kk",␣
 ↪"za"]
regije_polno = ["Osrednjeslovenska", "Savinjska", "Jugovzhodna S.",␣
 ↪"Podravska", "Gorenjska",
                "Koroška", "Primorsko-notr.", "Pomurska", "Obala", "Goriška",␣
 ↪"Posavska", "Zasavska"]
regije_keys = ["region.{}.todate".format(r) for r in regije]
```

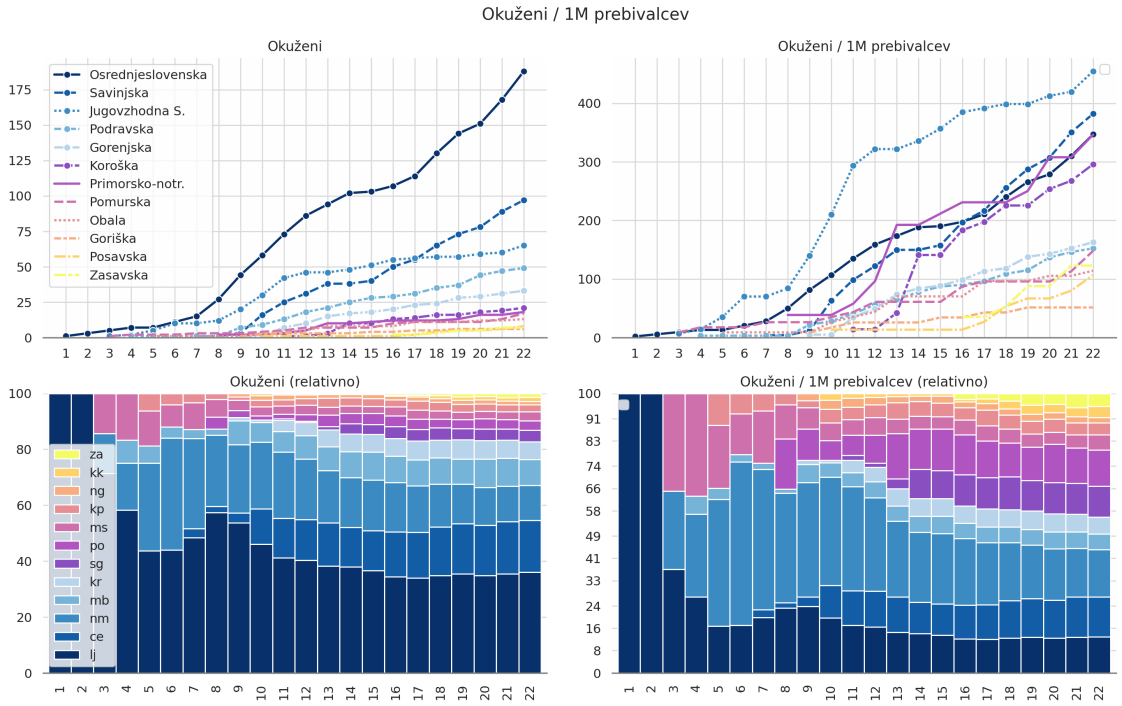
```
okuzeni_poregijah = d4[regije_keys]
okuzeni_poregijah_rel = okuzeni_poregijah.div(okuzeni_poregijah.sum(axis=1),␣
↪axis=0)*100

novi_poregijah = pd.concat((d4[regije_keys][0:1].fillna(0), d4[regije_keys].
↪fillna(0).diff()[1:]))
novi_poregijah_rel = novi_poregijah.div(novi_poregijah.sum(axis=1), axis=0)*100

poregijah_popul = okuzeni_poregijah/regije_populacija
poregijah_popul_rel = poregijah_popul.div(poregijah_popul.sum(axis=1),␣
↪axis=0)*100

novi_poregijah_popul = novi_poregijah/regije_populacija
```

[37]:
```
ind = 21

fig, ((ax5, ax6), (ax7, ax8)) = plt.subplots(nrows=2, ncols=2, figsize=(15, 9),␣
↪sharex="all")
fig.suptitle("Okuženi po regijah", y=0.96)

sns.barplot(ax=ax5, data=okuzeni_poregijah[regije_keys][ind:ind+1],␣
↪palette=cmap)
ax5.axhline(okuzeni[ind-1]/12, color="#ddda", linewidth=2, marker="")
utils_plot1(ax5, False, "Skupaj", None, None)

sns.barplot(ax=ax6, data=poregijah_popul[regije_keys][ind:ind+1], palette=cmap)
ax6.axhline(okuzeni[ind-1]/2, color="#ddda", linewidth=2, marker="")
utils_plot1(ax6, False, "Skupaj / 1M prebivalcev", None, None)

sns.barplot(ax=ax7, data=novi_poregijah[regije_keys][ind:ind+1], palette=cmap)
ax7.axhline(novi[ind-1]/12, color="#ddda", linewidth=2, marker="")
utils_plot1(ax7, False, "Novi", None, None)

sns.barplot(ax=ax8, data=novi_poregijah_popul[regije_keys][ind:ind+1],␣
↪palette=cmap)
ax8.axhline(novi[ind-1]/2, color="#ddda", linewidth=2, marker="")
utils_plot1(ax8, False, "Novi / 1M prebivalcev", None, None)
ax8.set_xticklabels(regije)
plt.show()
```



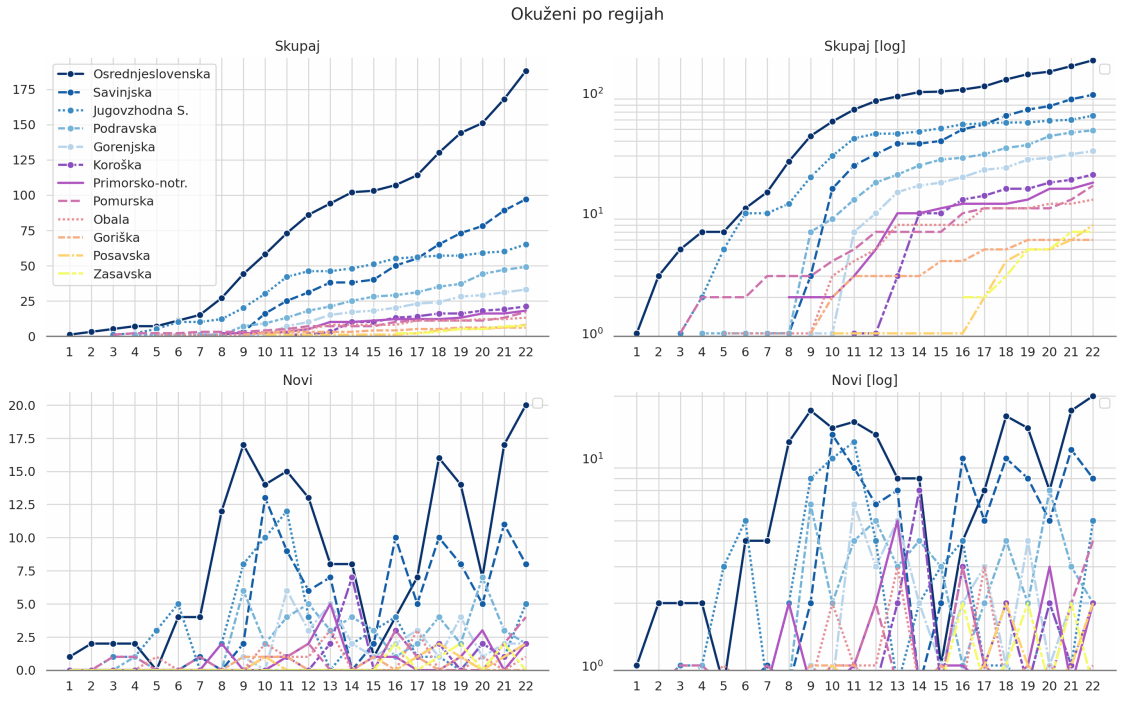

[26]:
```
current_palette = sns.color_palette()
sns.set_palette(cmap)

fig, ((ax1, ax2), (ax3, ax4)) = plt.subplots(nrows=2, ncols=2, figsize=(15, 9))
fig.suptitle("Okuženi / 1M prebivalcev")

sns.lineplot(data=okuzeni_poregijah[regije_keys[:6]], ax=ax1)
sns.set_palette(cmap[6:,:])
sns.lineplot(data=okuzeni_poregijah[regije_keys[6:]], marker="", ax=ax1)

ax1.legend(regije_polno)
leg = ax1.get_legend()
for i, h in enumerate(leg.legendHandles):
    h.set_color(cmap[i])
utils_plot1(ax1, False, "Okuženi", None, okuzeni_poregijah.index)
sns.set_palette(cmap)

sns.lineplot(data=poregijah_popul[regije_keys[:6]], ax=ax2)
sns.set_palette(cmap[6:,:])
sns.lineplot(data=poregijah_popul[regije_keys[6:]], marker="", ax=ax2)
ax2.legend("")
utils_plot1(ax2, False, "Okuženi / 1M prebivalcev", None, okuzeni_poregijah.
 ↪index)
```

```
poregijah_popul_rel.plot(color=cmap, kind="bar", stacked=True, width=1,␣
 ↪ylim=(0,100), ax=ax4)
ax4.legend("")
utils_plot1(ax4, False, "Okuženi / 1M prebivalcev (relativno)", None, None)
ax4.set_yticks([int(i/10) for i in range(0, 950, 83)] + [100])

okuzeni_poregijah_rel.plot(color=cmap, kind="bar", stacked=True, width=1,␣
 ↪ylim=(0,100), ax=ax3)
reverse_legend(ax3, regije)
utils_plot1(ax3, False, "Okuženi (relativno)", None, None)

sns.set_palette(current_palette)
```



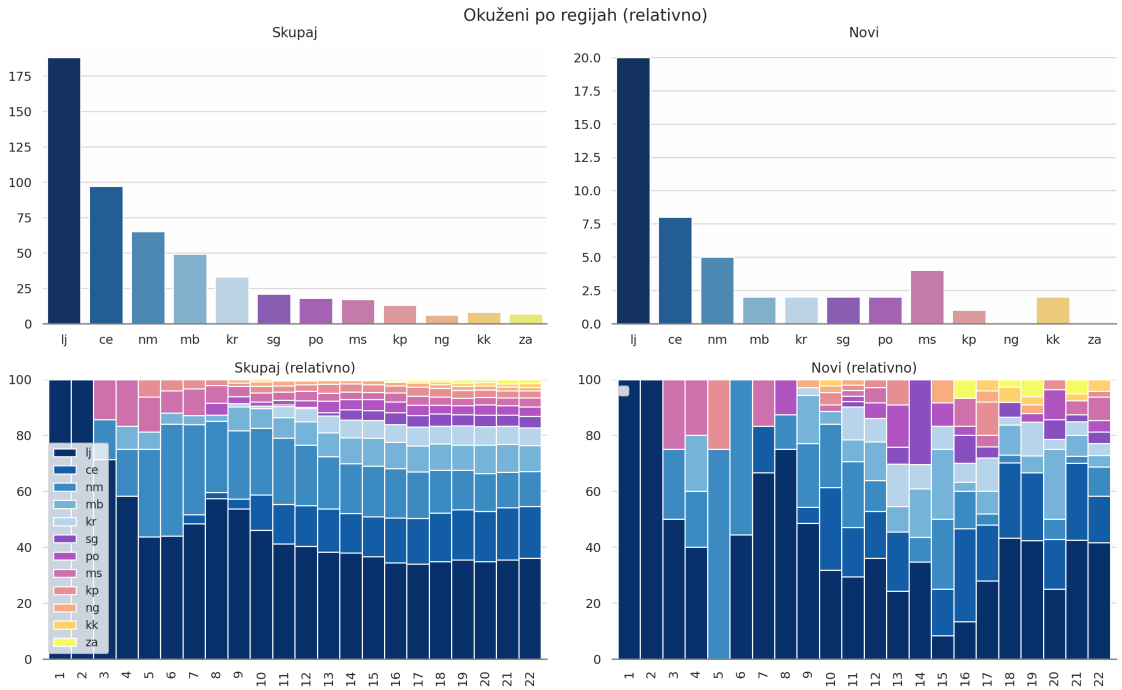

[38]:
```
current_palette = sns.color_palette()
sns.set_palette(cmap)
fig, ((ax1, ax2), (ax3, ax4)) = plt.subplots(nrows=2, ncols=2, figsize=(15, 9),␣
 ↪sharex="all")
fig.suptitle("Okuženi po regijah")
sns.lineplot(data=okuzeni_poregijah[regije_keys[:6]], ax=ax1)
sns.set_palette(cmap[6:,:])
sns.lineplot(data=okuzeni_poregijah[regije_keys[6:]], marker="", ax=ax1)
ax1.legend(regije_polno)
leg = ax1.get_legend()
for i, h in enumerate(leg.legendHandles):
```

```
    h.set_color(cmap[i])
utils_plot1(ax1, False, "Skupaj", None, d4.index)

sns.set_palette(cmap)
sns.lineplot(data=okuzeni_poregijah[regije_keys[:6]], ax=ax2)
sns.set_palette(cmap[6:, :])
sns.lineplot(data=okuzeni_poregijah[regije_keys[6:]], marker="", ax=ax2)
ax2.legend("")
utils_plot1(ax2, True, "Skupaj", None, None)

sns.set_palette(cmap)
sns.lineplot(data=(novi_poregijah[regije_keys[:6]]), ax=ax3)
sns.set_palette(cmap[6:])
sns.lineplot(data=(novi_poregijah[regije_keys[6:]]), marker="", ax=ax3)
ax3.legend("")
utils_plot1(ax3, False, "Novi", None, d4.index)

novi_poregijah2 = novi_poregijah.copy()
novi_poregijah2[novi_poregijah2==0] = 0.8

sns.set_palette(cmap)
sns.lineplot(data=(novi_poregijah2[regije_keys[:6]]), ax=ax4)
sns.set_palette(cmap[6:])
sns.lineplot(data=(novi_poregijah2[regije_keys[6:]]), marker="", ax=ax4)
ax4.legend("")
utils_plot1(ax4, True, "Novi", None, d4.index)
sns.set_palette(current_palette)
```



[42]:
```
fig, ((ax1, ax2), (ax5, ax6)) = plt.subplots(nrows=2, ncols=2, figsize=(15, 9))
fig.suptitle("Okuženi po regijah (relativno)", y=0.96)

okuzeni_poregijah_rel.plot(ax=ax5, kind="bar", stacked=True, width=1,␣
↪color=cmap)
ax5.legend(regije, loc="lower left", fontsize="small")
utils_plot1(ax5, False, "Skupaj (relativno)", (0, 100), None)
#reverse_legend(ax5)

novi_poregijah_rel.plot(ax=ax6, kind="bar", stacked=True, width=1, color=cmap)
utils_plot1(ax6, False, "Novi (relativno)", (0, 100), None)

sns.barplot(ax=ax1, data=okuzeni_poregijah[regije_keys][ind:ind+1],␣
↪palette=cmap)
utils_plot1(ax1, False, "Skupaj", None, None)
ax1.set_xticklabels(regije)

sns.barplot(ax=ax2, data=novi_poregijah[regije_keys][ind:ind+1], palette=cmap)
utils_plot1(ax2, False, "Novi", None, None)
ax2.set_xticklabels(regije)

ax6.legend("")
```

[42]:
```
<matplotlib.legend.Legend at 0x7f455cd91438>
```



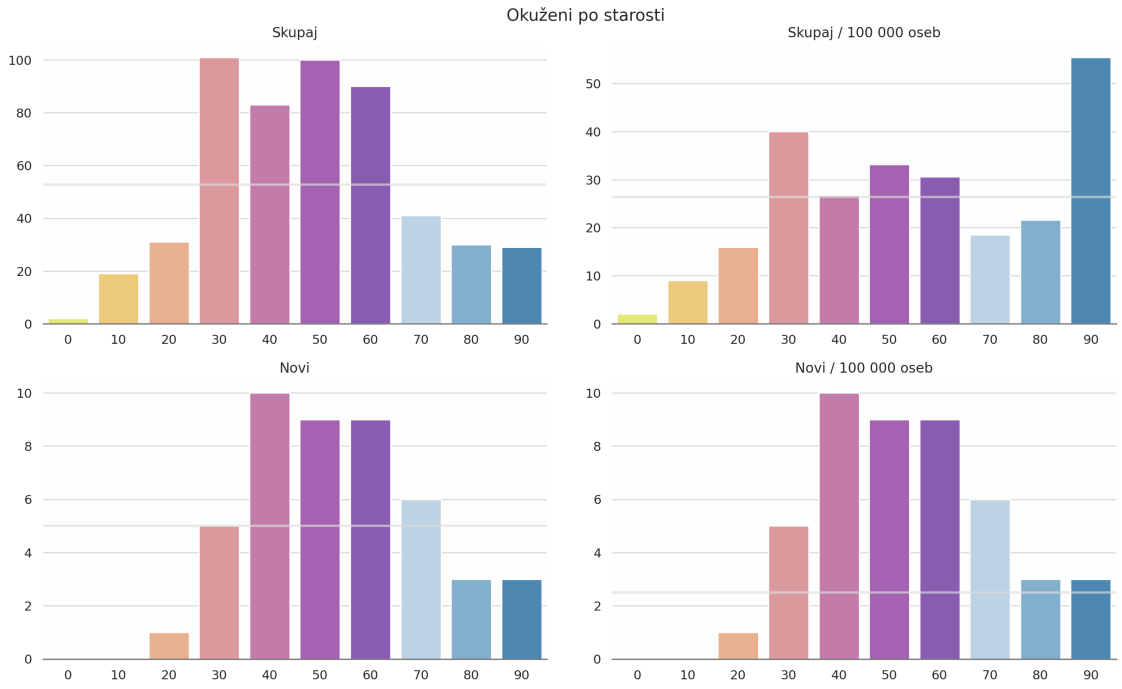
### 1.5.3 Starost

[29]:
```
# Starost
starosti = ["0-15", "16-29", "30-49", "50-59", "60+"]
avg_box = np.array([10, 22, 40, 55, 70])
avg_box1 = (np.array([5, 16, 30, 50, 60]) + avg_box)/2
avg_box2 = (np.array([15, 29, 49, 59, 90]) + avg_box)/2
starosti_keys = ["age.{}.todate".format(s) for s in starosti]
starosti10 = [str(i*10) for i in range(0, 10)]
avg_box10 = np.array([10*i for i in range(0, 10)])
avg_box110 = avg_box10 - 3
avg_box210 = avg_box10 + 3

okuzeni_postarosti = d4[cat((starosti_keys, starosti10))][8:]
okuzeni_postarosti_rel = okuzeni_postarosti.div(okuzeni_postarosti.sum(axis=1),␣
↪axis=0)*100

novi_postarosti = d4[cat((starosti_keys, starosti10))].diff()[8:]
novi_postarosti_rel = novi_postarosti.div(novi_postarosti.sum(axis=1),␣
↪axis=0)*100

starosti_populacija = np.array([1.        , 2.11111111, 1.94805195, 2.52631579,␣
↪3.10638298,
       3.01324503, 2.94545455, 2.21518987, 1.39175258, 0.52313883])
postarosti_popul = okuzeni_postarosti[starosti10]/starosti_populacija

avg_starost = (okuzeni_postarosti * cat((avg_box, avg_box10))).sum(axis=1).
↪div(okuzeni_postarosti.sum(axis=1), axis=0)
avg_starost1 = (okuzeni_postarosti * cat((avg_box1, avg_box110))).sum(axis=1).
↪div(okuzeni_postarosti.sum(axis=1), axis=0)
avg_starost2 = (okuzeni_postarosti * cat((avg_box2, avg_box210))).sum(axis=1).
↪div(okuzeni_postarosti.sum(axis=1), axis=0)
novi_avg_starost = (novi_postarosti * cat((avg_box, avg_box10))).sum(axis=1).
↪div(novi_postarosti.sum(axis=1), axis=0)
novi_avg_starost1 = (novi_postarosti * cat((avg_box1, avg_box110))).sum(axis=1).
↪div(novi_postarosti.sum(axis=1), axis=0)
novi_avg_starost2 = (novi_postarosti * cat((avg_box2, avg_box210))).sum(axis=1).
↪div(novi_postarosti.sum(axis=1), axis=0)
```

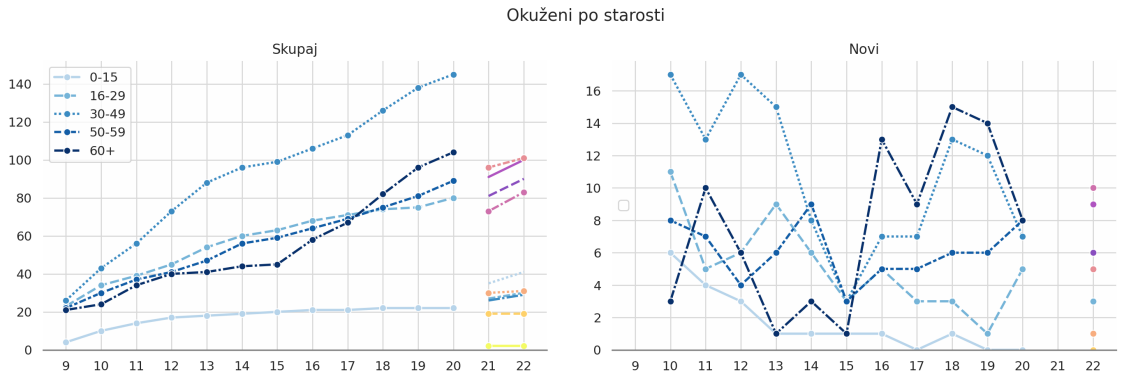
[30]:
```
dni10 = np.array([21])
starosti10 = [str(i*10) for i in range(0, 10)]
okuzeni_postarosti10 = d4[starosti10][20:]
```

```
okuzeni_postarosti10_rel = okuzeni_postarosti10.div(okuzeni_postarosti10.
↪sum(axis=1), axis=0)*100
avg_starost10 = (okuzeni_postarosti10 * np.array([10*i for i in range(0, 10)])).
↪sum(axis=1).div(okuzeni_postarosti10.sum(axis=1), axis=0)
avg_starost110 = (okuzeni_postarosti10 * np.array([10*i-3 for i in range(0,␣
↪10)])).sum(axis=1).div(okuzeni_postarosti10.sum(axis=1), axis=0)
avg_starost210 = (okuzeni_postarosti10 * np.array([10*i+3 for i in range(0,␣
↪10)])).sum(axis=1).div(okuzeni_postarosti10.sum(axis=1), axis=0)
```

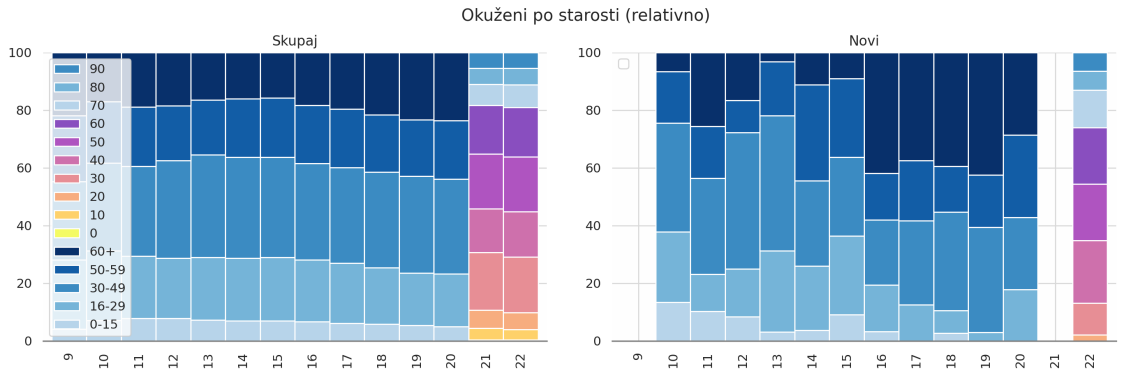
[31]:
```
ind = 21 - 8

fig, ((ax5, ax6), (ax7, ax8)) = plt.subplots(nrows=2, ncols=2, figsize=(15, 9),␣
↪sharex="all")
fig.suptitle("Okuženi po starosti", y=0.96)

sns.barplot(ax=ax5, data=okuzeni_postarosti[starosti10][ind:ind+1],␣
↪palette=cmap[::-1])
ax5.axhline(okuzeni[ind+7]/10, color="#ddda", linewidth=2, marker="")
utils_plot1(ax5, False, "Skupaj", None, None)

sns.barplot(ax=ax6, data=postarosti_popul[starosti10][ind:ind+1], palette=cmap[:
↪:-1])
ax6.axhline(okuzeni[ind+7]/20, color="#ddda", linewidth=2, marker="")
utils_plot1(ax6, False, "Skupaj / 100 000 oseb", None, None)

sns.barplot(ax=ax7, data=novi_postarosti[starosti10][ind:ind+1], palette=cmap[::
↪-1])
ax7.axhline(novi[ind+7]/10, color="#ddda", linewidth=2, marker="")
utils_plot1(ax7, False, "Novi", None, None)

sns.barplot(ax=ax8, data=novi_postarosti[starosti10][ind:ind+1], palette=cmap[::
↪-1])
ax8.axhline(novi[ind+7]/20, color="#ddda", linewidth=2, marker="")
utils_plot1(ax8, False, "Novi / 100 000 oseb", None, None)
ax8.set_xticklabels(starosti10)

plt.show()
```




[40]:
```
current_palette = sns.color_palette()
sns.set_palette(blues_dd)
fig, (ax1, ax2) = plt.subplots(nrows=1, ncols=2, figsize=(15, 5), sharex="all")

fig.suptitle("Okuženi po starosti")
sns.lineplot(data=okuzeni_postarosti[starosti_keys], ax=ax1)
cmapr = cmap[::-1]
sns.set_palette(cmapr[5:])
sns.lineplot(data=okuzeni_postarosti[starosti10[5:]], ax=ax1, marker="")
sns.set_palette(cmapr[:])
sns.lineplot(data=okuzeni_postarosti[starosti10[:5]], ax=ax1)
ax1.legend(starosti)
utils_plot1(ax1, False, "Skupaj", None, okuzeni_postarosti.index)

sns.set_palette(blues_dd)
sns.lineplot(data=novi_postarosti[starosti_keys], ax=ax2)
sns.set_palette(cmapr[5:])
sns.lineplot(data=novi_postarosti[starosti10[6:]], ax=ax2)
sns.set_palette(cmapr[:])
sns.lineplot(data=novi_postarosti[starosti10[:6]], ax=ax2)
ax2.legend("", loc="center left")
utils_plot1(ax2, False, "Novi", None, None)

plt.subplots_adjust(top=0.85, bottom=.15)
sns.set_palette(current_palette)
```




[41]:
```
fig, (ax5, ax6) = plt.subplots(nrows=1, ncols=2, figsize=(15, 5))
fig.suptitle("Okuženi po starosti (relativno)", y=0.96)

okuzeni_postarosti_rel[starosti_keys].plot(ax=ax5, kind="bar", stacked=True,␣
 ↪width=1, color=blues_d)
okuzeni_postarosti_rel[starosti10].plot(ax=ax5, kind="bar", stacked=True,␣
 ↪width=1, color=cmap[::-1])
ax5.legend("", loc="center left")
reverse_legend(ax5, cat((starosti, starosti10)))
utils_plot1(ax5, False, "Skupaj", (0, 100), None)

novi_postarosti_rel[starosti_keys].plot(ax=ax6, kind="bar", stacked=True,␣
 ↪width=1, color=blues_d)
novi_postarosti_rel[starosti10].plot(ax=ax6, kind="bar", stacked=True, width=1,␣
 ↪color=cmap[::-1])
ax6.legend("")
utils_plot1(ax6, False, "Novi", (0, 100), None)
plt.subplots_adjust(top=0.85, bottom=.15)
```



[34]:
```
fig, (ax7, ax8) = plt.subplots(nrows=1, ncols=2, figsize=(15, 5), sharex=True)
sns.lineplot(data=[avg_starost,avg_starost1, avg_starost2], err_style="band",␣
 ↪ax=ax7, color="b")
sns.lineplot(data=[novi_avg_starost,novi_avg_starost1, novi_avg_starost2],␣
 ↪err_style="band", ax=ax7, color="orange")
#sns.lineplot(ax=ax7, x=cat((dni10, dni10, dni10)), y=cat([avg_starost10.
 ↪to_numpy(),avg_starost110.to_numpy(),avg_starost210.to_numpy()]), color="b",␣
 ↪err_style="bars")
ax7.legend(["skupaj", "novi"], loc="upper left")
utils_plot1(ax7, False, "Povprečna starost", 25, avg_starost.index)
ax8.remove()
```