



UDK:911.3:30/33:725.51(575.1)

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GEOGRAPHICAL ASPECTS OF FORECASTING THE ACTIVITY OF SANATORIUMS.

Annotation

The analysis of the activity of sanatorium-resort facilities in the Fergana Valley regions can be done in several ways, in this article it can be observed that studying and forecasting the dynamic series of a certain period is also a very effective method.

Key word: Sanatorium and resort, dynamic series, trend, coefficient of determination, therapy, diagnosis.

ГЕОГРАФИЧЕСКИЕ АСПЕКТЫ ПРОГНОЗИРОВАНИЯ ДЕЯТЕЛЬНОСТИ САНАТОРИЕВ.

Аннотация

Анализ деятельности санаторно-курортных учреждений региона Ферганской долины можно провести несколькими способами, в данной статье можно заметить, что изучение и прогнозирование динамического ряда определенного периода также является весьма эффективным методом.

Ключевые слова: Санаторно-курортный комплекс, динамический ряд, тренд, коэффициент детерминации, терапия, диагностика.

SOG'LOMLASHTIRISH MASKANLARI FAOLIYATINI PROGNOZ QILISHNING GEOGRAFIK JIHATLARI.

Annotatsiya

Farg'ona vodiysi viloyatlari mavjud sanatoriy-kurort muassasalari faoliyati tahlilini bir necha usullarda amalga oshirish mumkin, ushbu maqolada ma'lum davr dinamik qatorini o'rganish va prognoz qilish ham juda samarali usul ekanligini kuzatish mumkin.

Kalit so'zlar: Sanatoriy va kurort, dinamik qator, tendentsiya, determinatsiya koeffitsienti, terapiya, diagnostika.

Kirish. Bugungi kunga kelib rekreatsiya va sog'lomlashtirish sohalarini barqaror rivojlanishi uning nafaqat mintaqalar iqtisodiyotining yetakchi sektori sifatidagi o'rnini, qolaversa yangi ishchi o'rinlarini yaratish va u bilan bog'liq tarmoqlarni majmuaviy ravishda rivojlantirishni taqozo etadi.

Sanatoriylarda davolangan kasallar soni bo'yicha: *Andijon viloyati* kesimida ijtimoiy-iqtisodiy jarayonlar dinamikasining muhim statistik ko'rsatkichi o'sish sur'ati bo'lib, u iqtisodiyotning intensivlashuvi sharoitida vaqt o'tishi bilan iqtisodiy salohiyatning oshishini o'lchaydi.

Dinamik qatorning ko'rsatkichlari

Davr	Kasallar soni, ming kishi	Absolyut o'sish	O'sish darajasi, %	O'sish sur'ati, %	1% o'sishning absolyut qiymati	O'sish sur'ati, %
2000	8	-	-	100	-	0
2001	8	0	0	100	0.08	0
2002	8.2	0.2	2.5	102.5	0.08	2.5
2003	8.3	0.1	1.22	101.22	0.082	1.25
2004	8.3	0	0	100	0.083	0
2005	8.4	0.1	1.2	101.2	0.083	1.25
2010	7.4	-1	-11.9	88.1	0.084	-12.5
2011	8.9	1.5	20.27	120.27	0.074	18.75
2012	8.8	-0.1	-1.12	98.88	0.089	-1.25
2013	7.1	-1.7	-19.32	80.68	0.088	-21.25
2014	6.3	-0.8	-11.27	88.73	0.071	-10
2015	4.8	-1.5	-23.81	76.19	0.063	-18.75
2016	4.5	-0.3	-6.25	93.75	0.048	-3.75

2017	5.6	1.1	24.44	124.44	0.045	13.75
2018	8.4	2.8	50	150	0.056	35
2019	7	-1.4	-16.67	83.33	0.084	-17.5
2020	2.5	-4.5	-64.29	35.71	0.07	-56.25
2022	6.5	4	160	260	0.025	50
Жами	127					

2022-yildan 2020-yilga nisbatan bemorlar soni 4 ming nafarga oshgan. Maksimal o'sish 2022 yilda (4 ming) kuzatiladi. Minimal o'sish 2020-yilda qayd etilgan (-4,5 ming miqdor). O'sish sur'ati ketma-ketlik tendentsiyasining pasayib borayotganini ko'rsatadi, bu bemorlar sonining sekinlashuvidan dalolat beradi.

Dinamik qatorning bazis ko'rsatkichlari

Davr	Kasallar soni, ming kishi	Absolyut o'sish	O'sish darajasi, %	O'sish sur'ati, %
2000	8	-	-	100
2001	8	0	0	100
2002	8.2	0.2	2.5	102.5
2003	8.3	0.3	3.75	103.75
2004	8.3	0.3	3.75	103.75
2005	8.4	0.4	5	105
2010	7.4	-0.6	-7.5	92.5
2011	8.9	0.9	11.25	111.25
2012	8.8	0.8	10	110
2013	7.1	-0.9	-11.25	88.75
2014	6.3	-1.7	-21.25	78.75
2015	4.8	-3.2	-40	60
2016	4.5	-3.5	-43.75	56.25
2017	5.6	-2.4	-30	70
2018	8.4	0.4	5	105
2019	7	-1	-12.5	87.5
2020	2.5	-5.5	-68.75	31.25
2022	6.5	-1.5	-18.75	81.25
Жами	127			

2022-yilda 2000-yilga nisbatan bemorlar soni 1.5 ming kishiga yoki 18.8% ga kamaygan. Interval qatorning o'rta qiymati

$$\bar{y} = \frac{\sum y_i}{n} \quad \bar{y} = \frac{127}{18} = 7.06$$

quyidagi formuladan hisoblanadi:

2000-yildan 2022-yilgacha bemorlarning o'rtacha soni 7,06 ming kishini tashkil etdi. O'rtacha o'sish sur'ati:

$$T_p = \sqrt[n-1]{\frac{y_n}{y_1}} \quad T_p = \sqrt[17]{\frac{6.5}{8}} = 0.9879$$

O'rtacha butun davr uchun tahlil qilingan ko'rsatkichning o'sishi 0,9879 ni tashkil etdi. O'rtacha o'sish sur'ati: $T_{np} = T_p - 1$; $T_{np} = 0.9879 - 1 = -0.0121$

O'rtacha har bir davrda bemorlar soni 1,2% ga kamaydi. O'rtacha mutlaq o'sish- bu bir qator dinamikada individual

mutlaq o'sishlarning umumlashtirilgan xarakteristikasi. O'rtacha mutlaq o'sish:

$$\overline{dy} = \frac{y_n - y_1}{n-1}$$

$$\overline{dy} = \frac{6.5 - 8}{17} = -0.0882$$

Har bir davr bilan bemorlar soni o'rtacha 0,0882 mingga kamaydi. O'rtacha o'sish sur'atidan foydalanib, prognozni amalga oshiramiz:

$y(2023) = 6.5 * 0.9879 = 6.42$; $y(2024) = 6.42 * 0.9879 = 6.34$; $y(2025) = 6.34 * 0.9879 = 6.27$; $y(2026) = 6.27 * 0.9879 = 6.19$; $y(2027) = 6.19 * 0.9879 = 6.12$

Bemorlar sonini yillar bo'yicha o'zgarishi egri chiziqlar to'plamidan mezonning minimal qiymatiga mos keladigani tanlanadi. Mana shunday mezonlardan biri determinatsiya koeffitsienti hisoblanadi:

y_i	Δ^1_i	Δ^2_i	O'sish sur'ati
8	-	-	-
8	0	-	1
8,2	0.2	0.2	1.025

8,3	0.1	-0.1	1.012
8,3	0	-0.1	1
8,4	0.1	0.1	1.012
7,4	-1	-1.1	0.881
8,9	1.5	2.5	1.203
8,8	-0.1	-1.6	0.989
7,1	-1.7	-1.6	0.807
6,3	-0.8	0.9	0.887
4,8	-1.5	-0.7	0.762
4,5	-0.3	1.2	0.938
5,6	1.1	1.4	1.244
8,4	2.8	1.7	1.5
7	-1.4	-4.2	0.833
2,5	-4.5	-3.1	0.357
6,5	4	8.5	2.6

Tadqiqotda o'rganilayotgan boshqa viloyatlar bo'yicha ham huddi shunda tahlilni amalga oshiramiz. **Namangan.**

Interval qatorning o'rta qiymati quyidagi formuladan hisoblanadi:

$$\bar{y} = \frac{\sum y_i}{n} \quad \bar{y} = \frac{706.9}{18} = 39.27$$

2000-yildan 2022-yilgacha bemorlarning o'rtacha soni 39,27 ming kishini tashkil etdi. O'rtacha o'sish sur'ati:

$$\overline{T_p} = \sqrt[n-1]{\frac{y_n}{y_1}} \quad \overline{T_p} = \sqrt[17]{\frac{37.9}{28.3}} = 1.0173$$

O'rtacha butun davr uchun tahlil qilingan ko'rsatkichning o'sishi 1,0173 ni tashkil etdi. O'rtacha o'sish sur'ati: $T_{np} = T_p -$

$$1; \quad T_{np} = 1.0173 - 1 = 0.0173$$

O'rtacha har bir davrda bemorlar soni 1,7% ga o'sgan. O'rtacha mutlaq o'sish.

$$\overline{dy} = \frac{y_n - y_1}{n-1} \quad \overline{dy} = \frac{37.9 - 28.3}{17} = 0.56$$

O'rtacha absolyut o'sishdan foydalanib, prognozni amalga oshiramiz:

$$y(2023) = 37.9 + 0.56 = 38.46; \quad y(2024) = 38.46 + 0.56 = 39.02; \quad y(2025) = 39.02 + 0.56 = 39.58; \quad y(2026) = 39.58 + 0.56 = 40.14; \quad y(2027) = 40.14 + 0.56 = 40.70$$

Farg'ona. Interval qatorning o'rta qiymati quyidagi formuladan hisoblanadi:

$$\bar{y} = \frac{\sum y_i}{n} \quad \bar{y} = \frac{913.6}{18} = 50.76$$

2000-yildan 2022-yilgacha bemorlarning o'rtacha soni 50,76 ming kishini tashkil etdi. O'rtacha o'sish sur'ati:

$$\overline{T_p} = \sqrt[n-1]{\frac{y_n}{y_1}} \quad \overline{T_p} = \sqrt[17]{\frac{84.1}{27.1}} = 1.0689$$

O'rtacha butun davr uchun tahlil qilingan ko'rsatkichning o'sishi 1,0689 ni tashkil etdi. O'rtacha o'sish sur'ati: $T_{np} = T_p -$

$$1; \quad T_{np} = 1.0689 - 1 = 0.0689$$

O'rtacha har bir davrda bemorlar soni 6,9% ga o'sgan. O'rtacha mutlaq o'sish.

$$\overline{dy} = \frac{y_n - y_1}{n-1} \quad \overline{dy} = \frac{84.1 - 27.1}{17} = 3.35$$

O'rtacha o'sish sur'atidan foydalanib, prognozni amalga oshiramiz:

$$y(2023) = 84.1 * 1.0689 = 89.89; \quad y(2024) = 89.89 * 1.0689 = 96.09; \quad y(2025) = 96.09 * 1.0689 = 102.71; \quad y(2026) = 102.71 * 1.0689 = 109.21; \quad y(2027) = 109.21 * 1.0689 = 116.73$$

Andijon viloyati bo'yicha - sanatoriylarda davolangan bolalar soni bo'yicha: Stoxastik prognozlar uchun muhim usul eksponentsial tekislash usuli hisoblanadi. Bu usul dinamika qatorini sirpanuvchi o'rtacha yordamida tekislashdan iborat bo'lib, unda og'irliklar eksponentsial qonunga bo'ysunadi. Eksponentsial o'rtacha St orqali belgilanadi. U eng katta vaznga ega bo'lgan dinamika seriyasining oxirgi qiymatlarining xarakteristikasi hisoblanadi. Eksponentsial o'rtacha rekurrent formula yordamida hisoblanadi: $S_t = a * Y_t + (1 - a) S_{t-1}$

Bu yerda S_t - t vaqtidagi o'rtacha ko'rsatkichning qiymati; S_{t-1} - hozirgi vaqtda eksponentsial o'rtacha qiymati ($t = 1$); S_0 boshlang'ich parametriga kelsak, masalalarda u, y_1 qatorning birinchi darajali qiymatiga teng yoki qatorning birinchi bir necha

hadlarining o'rtacha arifmetik qiymatiga teng qabul qilinadi. Yt – ko'rsatkichli jarayonning t vaqtidagi qiymati; α - dinamika seriyasining (yoki tekislash parametrining) t-qiymatining og'irligi.

Ushbu modeldagi eng muhim xarakteristika α bo'lib, uning qiymati amalda prognoz qilish uchun foydalaniladi. Ushbu parametrning qiymati 1 ga qanchalik yaqin bo'lsa, prognoz dinamika seriyasining oxirgi darajalarining ta'sirini shunchalik ko'p hisobga oladi. Agar α 0 ga yaqin bo'lsa, u holda dinamika qatorining darajalari tortiladigan og'irliklar asta-sekin kamayadi, ya'ni prognozni tuzishda seriyaning barcha o'tgan darajalari hisobga olinadi. Quyidagi formula yordamida α parametrini topamiz: $\alpha = 2/(23+1) = 0.0833$

S_0 sifatida biz qatorning dastlabki 5 ta qiymatining o'rtacha arifmetik qiymatini olamiz. $S_0 = (0.1 + 0.5 + 0.8 + 0.9 + 2.1)/5 = 0.88$

t	y	S_t	Formula	$(y - S_t)^2$
2000	0,1	0.165	$(1 - 0.0833)*0.1 + 0.0833*0.88$	0.00422
2001	0,5	0.472	$(1 - 0.0833)*0.5 + 0.0833*0.16$	0.000779
2002	0,8	0.773	$(1 - 0.0833)*0.8 + 0.0833*0.47$	0.000746
2003	0,9	0.889	$(1 - 0.0833)*0.9 + 0.0833*0.77$	0.000112
2004	2,1	1.999	$(1 - 0.0833)*2.1 + 0.0833*0.89$	0.0102
2005	0,5	0.625	$(1 - 0.0833)*0.5 + 0.0833*2$	0.0156
2006	1	0.969	$(1 - 0.0833)*1 + 0.0833*0.62$	0.000976
2007	1,3	1.272	$(1 - 0.0833)*1.3 + 0.0833*0.97$	0.000761
2008	1,2	1.206	$(1 - 0.0833)*1.2 + 0.0833*1.27$	0.000000
2009	1,4	1.384	$(1 - 0.0833)*1.4 + 0.0833*1.21$	0.000261
2010	1,4	1.399	$(1 - 0.0833)*1.4 + 0.0833*1.38$	0.000000
2011	1,4	1.4	$(1 - 0.0833)*1.4 + 0.0833*1.4$	0.000000
2012	1,4	1.4	$(1 - 0.0833)*1.4 + 0.0833*1.4$	0.000000
2013	1,8	1.767	$(1 - 0.0833)*1.8 + 0.0833*1.4$	0.00111
2014	2	1.981	$(1 - 0.0833)*2 + 0.0833*1.77$	0.000378
2015	2,3	2.273	$(1 - 0.0833)*2.3 + 0.0833*1.98$	0.000708
2016	2,1	2.114	$(1 - 0.0833)*2.1 + 0.0833*2.27$	0.000209
2017	2,4	2.376	$(1 - 0.0833)*2.4 + 0.0833*2.11$	0.000566
2018	1,6	1.665	$(1 - 0.0833)*1.6 + 0.0833*2.38$	0.00418
2019	1,6	1.605	$(1 - 0.0833)*1.6 + 0.0833*1.66$	0.000000
2020	1,3	1.325	$(1 - 0.0833)*1.3 + 0.0833*1.61$	0.000647
2021	1,3	1.302	$(1 - 0.0833)*1.3 + 0.0833*1.33$	0.000000
2022	1,8	1.759	$(1 - 0.0833)*1.8 + 0.0833*1.3$	0.00172
				0.0432

Ekspontsial tekislash yordamida prognoz qilish. Tekislash prognozlash usullari regressiya tahlilidan foydalanadigan usullardan ko'ra o'ta ko'rsatkichlarning ta'sirini ancha yaxshi hisobga oladi. Asosiy tenglama: $S(t+1) = S(t)(1 - \alpha) + \alpha Y(t)$

$S(t)$ – t vaqtida tuzilgan prognoz, $S(t+1)$ esa t vaqtdan keyingi davrdagi prognozni aks ettiradi: $S(2022+1) = 1.759(1 - 0.0833) + 0.0833 * 1.8 = 1.762$

$$e_t = \sqrt{\frac{\sum (y_i - S_{i-1})^2}{n-1}}$$

Standart xatolik quyidagi formula bo'yicha hisoblanadi:

$$e_t = \sqrt{\frac{0.0432}{23-1}} = 0.0443$$

Bu yerda, $i = (t - 2, t)$,

Yuqorida bajarilgan amallar Namangan hamda Farg'ona viloyatlaridagi bolalar sanatoriylarida davolangan bolalar soni bo'yicha amalga oshiramiz:

Namangan	Farg'ona
$S_0 = (2.9 + 3 + 3.2 + 3.4 + 3.5)/5 = 3.2$	$S_0 = (2 + 2.2 + 2.3 + 2.3 + 2.4)/5 = 2.24$
$e_t = \sqrt{\frac{0.597}{23-1}} = 0.165$	$e_t = \sqrt{\frac{0.138}{23-1}} = 0.0793$
$S(2022+1) = 6.04(1 - 0.0833) + 0.0833 * 6.2 = 6.053$	$S(2022+1) = 1.25(1 - 0.0833) + 0.0833 * 1.2 = 1.246$

Dinamik qatorning ko'rsatkichlari yordamida prognoz

Dinamik qatorning ko'rsatkichlari

Davr	Kasallar soni, ming kishi	Absolyut o'sish	O'sish darajasi, %	O'sish sur'ati, %	1% o'sishning absolyut qiymati	O'sish sur'ati, %
2000	8	-	-	100	-	0
2000	0.1	-	-	100	-	0
2001	0.5	0.4	400	500	0.001	400
2002	0.8	0.3	60	160	0.005	300
2003	0.9	0.1	12.5	112.5	0.008	100
2004	2.1	1.2	133.33	233.33	0.009	1200
2005	0.5	-1.6	-76.19	23.81	0.021	-1600
2006	1	0.5	100	200	0.005	500
2007	1.3	0.3	30	130	0.01	300
2008	1.2	-0.1	-7.69	92.31	0.013	-100
2009	1.4	0.2	16.67	116.67	0.012	200
2010	1.4	0	0	100	0.014	0
2011	1.4	0	0	100	0.014	0
2012	1.4	0	0	100	0.014	0
2013	1.8	0.4	28.57	128.57	0.014	400
2014	2	0.2	11.11	111.11	0.018	200
2015	2.3	0.3	15	115	0.02	300
2016	2.1	-0.2	-8.7	91.3	0.023	-200
2017	2.4	0.3	14.29	114.29	0.021	300
2018	1.6	-0.8	-33.33	66.67	0.024	-800
2019	1.6	0	0	100	0.016	0
2020	1.3	-0.3	-18.75	81.25	0.016	-300
2021	1.3	0	0	100	0.013	0
2022	1.8	0.5	38.46	138.46	0.013	500
Jami	32.2					

2022-yilda 2021-yilga nisbatan bemorlar soni 0.5 ming nafarga oshgan. Maksimal o'sish 2004-yilda (1.2 ming) kuzatiladi. Minimal o'sish 2005-yilda qayd etilgan (-1.6 ming miqdor). O'sish sur'ati ketma-ketlik tendentsiyasining pasayib borayotganini ko'rsatadi, bu bemorlar sonining sekinlashuvidan dalolat beradi. 2022-yilda 2000-yilga nisbatan bemorlar soni 1.7

ming kishiga oshgan. Interval qatorning o'rta qiymati quyidagi formuladan hisoblanadi:

$$\bar{y} = \frac{\sum y_i}{n}$$

$$\bar{y} = \frac{32.2}{23} = 1.4$$

; 2000-yildan 2022-yilgacha bemorlarning o'rtacha soni 7,06 ming kishini tashkil etdi. O'rtacha o'sish sur'ati:

$$\overline{T_p} = \sqrt[n-1]{\frac{y_n}{y_1}} \quad \overline{T_p} = \sqrt[22]{\frac{1.8}{0.1}} = 1.1404$$

O'rtacha butun davr uchun tahlil qilingan ko'rsatkichning o'sishi 0,9879 ni tashkil etdi. O'rtacha o'sish sur'ati: $T_{np} = T_p - 1$; $T_{np} = 1.1404 - 1 = 0.14$

O'rtacha har bir davrda bemorlar soni 14% ga oshgan. O'rtacha mutlaq o'sish - bu bir qator dinamikada individual

$$\overline{dy} = \frac{y_n - y_1}{n - 1}$$

mutlaq o'sishlarning umumlashtirilgan xarakteristikasi. O'rtacha mutlaq o'sish:

$$\overline{dy} = \frac{1.8 - 0.1}{22} = 0.0773$$

Har bir davr bilan bemorlar soni o'rtacha 0,0773 mingga oshgan. O'rtacha o'sish sur'atidan foydalanib, prognozni amalga oshiramiz:

$y(2023) = 1.8 * 1.1404 = 2.05$; $y(2024) = 2.05 * 1.1404 = 2.34$; $y(2025) = 2.34 * 1.1404 = 2.67$; $y(2026) = 2.67 * 1.1404 = 3.045$; $y(2027) = 3.045 * 1.1404 = 3.47$

Namangan. Interval qatorning o'rta qiymati quyidagi formuladan hisoblanadi:

$$\bar{y} = \frac{\sum y_i}{n} \quad \bar{y} = \frac{122}{23} = 5.3$$

2000-yildan 2022-yilgacha bemorlarning o'rtacha soni 5,3 ming kishini tashkil etdi. O'rtacha o'sish sur'ati:

$$\overline{T_p} = \sqrt[n-1]{\frac{y_n}{y_1}} \quad \overline{T_p} = \sqrt[22]{\frac{6.2}{2.9}} = 1.0351$$

O'rtacha butun davr uchun tahlil qilingan ko'rsatkichning o'sishi 1,0351 ni tashkil etdi. O'rtacha o'sish sur'ati: $T_{np} = T_p - 1$; $T_{np} = 1.0351 - 1 = 0.0351$

O'rtacha har bir davrda bemorlar soni 3,5% ga o'sgan. O'rtacha mutlaq o'sish.

$$\overline{dy} = \frac{y_n - y_1}{n - 1} \quad \overline{dy} = \frac{6.2 - 2.9}{22} = 0.15$$

O'rtacha o'sish sur'atidan foydalanib, prognozni amalga oshiramiz: $y(2023) = 6.2 * 1.0351 = 6.42$; $y(2024) = 6.42 * 1.0351 = 6.64$; $y(2025) = 6.64 * 1.0351 = 6.88$; $y(2026) = 6.88 * 1.0351 = 7.12$; $y(2027) = 7.12 * 1.0351 = 7.37$

Farg'ona. Interval qatorning o'rta qiymati quyidagi formuladan hisoblanadi:

$$\bar{y} = \frac{\sum y_i}{n} \quad \bar{y} = \frac{70.1}{23} = 3.05$$

2000-yildan 2022-yilgacha bemorlarning o'rtacha soni 3,05 ming kishini tashkil etdi. O'rtacha o'sish sur'ati:

$$\overline{T_p} = \sqrt[n-1]{\frac{y_n}{y_1}} \quad \overline{T_p} = \sqrt[22]{\frac{1.2}{2}} = 0.977$$

O'rtacha butun davr uchun tahlil qilingan ko'rsatkichning o'sishi 1,0351 ni tashkil etdi. O'rtacha o'sish sur'ati: $T_{np} = T_p - 1$; $T_{np} = 0.977 - 1 = -0.023$

O'rtacha har bir davrda bemorlar soni 2,3% ga kamaygan. O'rtacha mutlaq o'sish.

$$\overline{dy} = \frac{y_n - y_1}{n - 1} \quad \overline{dy} = \frac{1.2 - 2}{22} = -0.0364$$

O'rtacha o'sish sur'atidan foydalanib, prognozni amalga oshiramiz: $y(2023) = 1.2 * 0.977 = 1.17$; $y(2024) = 1.17 * 0.977 = 1.15$; $y(2025) = 1.15 * 0.977 = 1.12$; $y(2026) = 1.12 * 0.977 = 1.09$; $y(2027) = 1.15 * 0.977 = 1.07$

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