

## VALORIZATION OF THERAPEUTIC FACTORS IN THE UPPER BASIN OF MOLDAVIAN BISTRITA RIVER

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**Abstract:** The article refers to the identification and quantification of the different ways of using the natural and anthropogenic factors of therapeutic treatment in the upper basin of the Moldavian Bistrita river (therapeutic climatic factors, minerals, hydrominerals, pedological, pits, aerosols, chrenotherapy, health infrastructure, health services, the social, political, economic and cultural context) in the prevention and treatment of certain chronic and infectious medical affections. The medical use of balneary and climatic resources is increasing in all European countries, which is mainly determined by the body's needs (especially in urban areas), associated with the increase of wear character disease (cardiovascular, metabolic, rheumatic, degenerative, respiratory disease etc.) or the so called “material comfort” disease, often also requiring natural remedies of prevention, control and treatment.

**Keywords:** *natural and anthropogenic therapeutic factors, pits, mud therapy, medical practices and procedures, social and political factors, individual factors of therapeutic treatment.*

### 1. Introduction

The upper basin of the Moldavian Bistrita river includes, from the administrative point of view, a municipality (Vatra Dornei) and nine villages (Carlibaba, Ciocanesti, Iacobenii, Poiana Stampei, Cosna, Dorna Candrenilor, Saru Dornei, Panaci and Dorna Arini), while from the physical-geographical point of view, it contains a mountain depression (Dorna Depression) and some surrounding mountains (Rodnei, Suhard, Obcina Mestecanisului, Rarau Giumalau mountains, Bistritei, Bargaului and Calimani Mountains).

The main therapeutic factors found and used in this area are the natural ones, represented by mineral waters, pits, peat mud and a tonic stimulative bio climate, and respectively the anthropogenic ones, also represented by the treatment infrastructure, methodology and medical practices, social politics and, last but not least, by individual factors, which, although not directly and explicitly studied by human geography, equally influence the evolution of people's health.

### 2. Natural factors for therapeutic treatment and their utilization

#### *Mineral waters*

Known since the early 19<sup>th</sup> century as a “Mecca for healing” (Taranu, P.,1990), Vatra Dornei is highlighted in particular by the abundance of mineral springs employed both for internal treatment (chrenotherapy) and for external treatment, administrated through complex medical procedures existing in the treatment bases of the resort.

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It is known that not all mineral water is a therapeutic water, so we consider therapeutic waters only those arising from a natural source or updated by drilling, and whose physicochemical qualities can have pharmacodynamic effects when employed therapeutically (Teleki, K et al., 1984) prophylactically, curatively and for recovery, mainly in the treatment centres and only sometimes at a doctor's recommendation, at the patient's home.

The mineral springs in Vatra Dornei are first mentioned in Hacquet's works of travels (1787, after Pricajan, A. and 1790 according to Stoicescu, C.). In 1806, after a visit in the region, the doctor in medicine Ignatie Plush undertook steps in order to capture and use the mineral waters, considered to be, in his opinion, "of the best quality" (Taranu P. 1999), a statement which stands true until today. So, after 1808, the first balneary equipment is established, being endowed with ten cabinets for bathing (Teleki, N.). After 29th September 1855 (the date when the village turns into a borough), balneotherapy begins to enjoy a privileged place in the system of economic and social existence, the most obvious example being "Fountain John" building, which becomes a heraldic element, present on the seal of the borough ever since.

The mineral waters found in Vatra Dornei and in the surrounding villages are both carbonated, bicarbonated, calcium, magnesium, sodium, ferruginous, hypotonic, with a mineralization of 0,5/3,1 g/l (Teleki), and ferruginous (at Iacobeni) or arsenic waters (at Saru Dornei), with a content of at least 0,7 mg/l arsenic (Pricajan, A.). Both ferruginous and arsenic mineral waters have not been exploited constantly and systematically in time.

The exploitation and trading of bicarbonated mineral waters for household consumption is currently done at Vatra Dornei, Dorna Candrenilor (Bucovina and Dorna mineral waters), Poiana Negrii (eponymus name water) and in Panaci village (Aqua Carpatica).

#### *The pits*

The main natural gases with therapeutic effects are carbon dioxide, nitrogen, hydrogen sulfide and rare gases. The carbon dioxide efflux met under the form of free gas in volcanic areas is known as pit (mofetta), natural or arranged. Regarding the natural pit, it consists in capturing the emitted gas and using it in a therapeutic purpose, in specially arranged rooms, which allows an inclined accumulation of air (Teleki, N.). The microclimate of arranged pits is characterized by a temperature between 12-22 degrees, a relative humidity of 50-80%, a medium radioactivity of 0.3 ions 2000-15000 ions/cm and a CO<sub>2</sub> volume of 80-99 vol% (Nemes, D.)

The employing of CO<sub>2</sub> emanation is apparently far superior to carbonated mineral waters because it eliminates the mechanical and thermal factor present when bathing, a special benefit for the patients with cardiovascular diseases (Smith, R., 2003). At present, the pit use in therapeutic practice is carried out successfully in the treatment bases in Vatra Dornei.

#### *Sludge/mud therapy*

Known as peloides and classified according to origin and physicochemical properties in sapropelic muds peat and spring mineral mud, sapropelic muds are those "substances that are formed under the influence of the natural geological processes and which, in fine divided conditions and water mixture, are used in medical practice in baths or local procedures, "predominantly in locomotor affections. Taking birth in the Quaternary era, peats represent the shift from wood to coal, consisting mainly of cellulose, carbohydrates, lignin, proteins, pectic substances and humic acids, the latter being the peat's most important component (Teleki, N.).

Present in the marshes of Poiana Stampei, the peat mud is locally known as "black loam" or "black swamp", this being used successfully in the empirical medicine in Dorna since ancient times (Taranu, P.), but at present, because of some political and/or economic

reasons, its exploitation and utilization in therapeutic purposes has been interrupted, its sale being realized by a private company as...potting (soil for flowers).

#### *Tonic stimulative bioclimate*

The temperature ranges around + 6,4 degrees, from -7 degrees in January to +16 degrees in July, with an atmospheric pressure of 690 mm. The annual average rainfall is of 900 mm and the rainfall's density is maximum in June and July, but also in winter (making a snow depth of 1.1/1.6 m). Climatically, the region is, most of the year, accessible to air masses from the west (Popa, N, 1997). Heatstroke is moderate throughout the year and the average length of the day grows, at this latitude, to 7 hours and 40 minutes between the winter solstice and the summer solstice, comparatively to 6 hours in southern areas (Chirita, V., 2003).

The complex of climatic factors (temperature, humidity, wind speed, solar radiation) has a thermal action on the body, causing a state of comfort or bioclimatic stress with direct or indirect effects on the body's thermoregulatory processes (Teleki, N.). For Vatra Dornei and the surrounding villages, the thermal comfort registers in July, at noon, a total of 6 days, while the number of days of discomfort by heating is 2, the rest of the days registering a discomfort by cooling. Regarding the annual average skin bioclimatic stress, it has a relatively low index(13), so the most relaxing days are from May to October. The total bioclimatic stress registers a total of 43, thus resulting a tonic bioclimatic stimulant for the body, with some shades of sedation (Teodoreanu Elena, 1984).

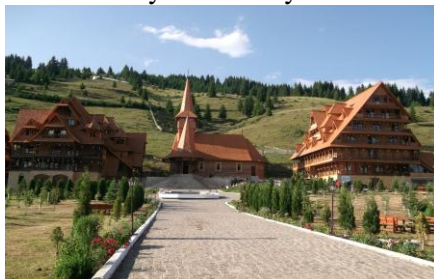
A very important natural therapeutic element is Park bathing establishment, with an area of 50 ha, declared Natural Reservation after the First World War, thus being introduced under law protection ever since. After the Second World War, the Reservation preserved its status of scientific interest and came under the patronage of the Romanian Academy. The aeroelectric climate in Park is beneficial for the physical and mental state of a person. Topoclimatically and bioclimatically, the northern slope of Dealu Negru is a good source of natural healing factors, the fresh air being of an undeniable quality. It is known that the natural radio emanation is most active in hydromineralizant fields, an emanation that, used in therapeutic limits, represents another natural element with a beneficial influence on health. Created especially to serve as a means of protecting the hydromineral deposits located in the territorial area of reference, the Park resort serves as a protecting barrier against noxious pollutants from neighbouring atmosphere: carbon dioxide, sulphur dioxide, dust particles etc. In hot summer evenings, aerosols are concentrated, deriving from the evaporation, under sunlight concentration, of essential oils from conifer leaves. The presence of this phenomenon may be perceived by collecting the resin flavours in the air accompanying aerosols. In the park area, after rains accompanied by lightening, one can feel, a refreshing, strongly ozonated air. The natural cure factors in their diversity give the park the character of a real health-generating laboratory (Taranu, P.).

In addition to the protective role against strong winds, a compact forest near a resort has also the role to adapt the thermal extremes, increased moisture, ionization and aerosols as well as to adjust the responsiveness to negative factors, body training and hardening (Teleki, N.), all these supporting the treatment and prevention of the diseases treated in the treatment and rest bases in Vatra Dornei and Dorna Arini, respectively.

According to the writings of Dr. Adler in the years 1813-1818, the people who came to treatment used the time left after the cure mostly for walks, considered an essential element in the balneary treatment, those days Dorna being considered a Mecca for the sick (Taranu P.)

### 3. Anthropogenic factors of therapeutic treatment

The health infrastructure, represented especially by the existent treatment bases, is highlighted by the treatment accommodation and alimentation base called Dorna Turism (formed by the hotels Bradul, Calimani and Intus, Vila Ozon, Incom Hotel, Dorna Hotel). Recently established (in 2011), The Rest and Treatment Base “Procopie and Elisabeta” from Gheorghiteni, Dorna Arini is situated only 3 km away from the old resort Vatra Dornei.



*Figure 1 Procopie and Elisabeta”- Dorna Arini*



*Figure 2 Călimani Hotel - Vatra Dornei*



*Figure 3 Intus Hotel –Vatra Dornei*

*The procedures, techniques and treatment methods* are similar in most of the treatment bases, with a few differences in some cases, regarding the duration and costs of the procedure, according to the doctor`s recommendations, the economic politics existing in each of these balneary units and, of course, to the marketing strategies used in order to attract a larger number of direct beneficiaries.

Here are some examples of medical *procedures* used in the treatment bases in Vatra Dornei and Dorna Arini: diathermy, lasertherapy, galvanotherapy, medicinal hub baths, dry

and wet sauna, hydrotherapy in ozone at Dorna Arini and in carbon at Vatra Dornei, diadinamic currents, Tens, rectangular and inferential, ultrasounds, Jacuzzi, mud packs (mud brought from Techirghiol at Dorna Arini), short wave, magnetotherapy, aerosols, etc.

In applying the specific physical-balneary therapeutic methods, the resorts are provided with complex endowments: balneotherapy equipment (basins and individual tubs), crenotherapy equipment, facilities for climatotherapy (heliotherapy, solariums), hydro and thermotherapy installations, space and special devices for kinetotherapy (medical gymnastics rooms, basins, mecanotherapy devices, ergonometric bicycles), electrotherapy equipment, massage, pneumotherapy installations (inhalation therapy), special arranging for practicing the field cure, sport grounds (Teleki, N.). All these facilities and utilities are also present in Vatra Dornei resort and most of them in the treatment base in Dorna Arini.

The main medical procedures offered by The Rest and Treatment Base “Procopie and Elisabeta” in Dorna Arini are represented by:

- therapeutic currents* (galvanic, diadinamic, Trabert, Tens, interferential, exponential) which, according to the desired settings, modulate the painful perception at the level of the receptors, relaxing or stimulating the muscles, activate the blood circulation, having local anti inflammatory effects on different muscular disorders, contractures/hypotonicity, nerve disturbances and, of course, motor deficiencies (paresis, paralysis) and sensitive deficiencies;

- *diathermy through radiofrequency*, consisting in the application of bipolar radio frequencies, capable of interfering in a regulatory way the cellular activity stimulating the regeneration of the muscular and osseous cell. The therapeutic effect combines in proportions controlled by the selected parameters, biostimulation with local heating, directed, as required, to the tissues (muscles, articulations, bones), resistive diathermy or at the surface (skin, subcutaneous tissue, peripheral nerves) with excellent results in treating locomotor deficiencies, but also in plastic surgery.

- general (partial) hydrotherapy in ozone* corresponds to a modern concept of treatment, based on the observation that the lack of oxygen is the cause of cellular affection. The ozone (generated by the Ozonomatic machine) dispersed in the bathroom has an activating effect on the blood circulation and the transport of oxygen, on metabolism and the body's immunologic response. The ozone bath is disinfectant, detoxifying, the gas bubbles giving, in addition, a stimulating micromassage at the skin level with hydrating, softening results, reducing the “orange peel” aspect.

- medical gymnastics* is recommended to children and adults for maintaining or correcting posture or spine or limbs, maintaining and recovering articular mobility, adjusting muscular tonus, redressing the balance, correcting breathing deficiencies, training to effort.

- medical hub baths* : the utilization of the beneficent hubs in the area, whose fresh infusion (mixed in the bath at 37-38°C), provide relaxing effects, stimulating and detoxifying at the same time, also recommended in locomotor deficiencies, neurosis, neuropathology, neuralgia, neuritis, post traumatic, neurological, peripheral side effects.

- galvanic baths*: the treatment combines the action of direct current with the benefits of hot water immersion, these baths being successfully used in treating degenerative and inflammatory arthritis, articulatory affections or peripheral circulation disorders.

The therapeutic treatment has a particular methodology, scientifically founded, offering various applicable possibilities to all age categories and in all therapeutic processes, having yet precise rules of application according to the indications and limitations of each factor in case. Thus, for the main existing therapeutic factors, exploited and used in Vatra Dornei resort, Petru Taranu presents in “*Memoria Dornelor*” the main recommendations and counter indications regarding their use, such as :

- indications are especially for myocardium diseases, valvular lesions, blood vessels diseases, articular diseases, tendon, muscle and bone diseases, disorders of the peripheral nervous system, gynaecological diseases, secondary anaemia, endocrine affections, hypochlorhydria.
- the counter indications refer especially to all the acute diseases, the infectious diseases in the contagious period, as well as to those with complications such as chronic affections, malignant tumours, no matter the stage or location, and all serious blood diseases.

#### *The political and decisional factors*

According to the government decision in August 2013, regarding the therapeutic status for some towns and regions which provide natural therapeutic sources, the Romanian Government completes the list of existing resorts with new ones, including Vatra Dornei, which, although famous for its facilities, hasn't benefited from a certificate to attest this status (apart from being considered a national interest tourist resort.)

Vasile Cepoi, a health counsellor, and other interdepartmental members initiated The Health Tourism strategy at the end of August 2013, elaborating a series of necessary criteria for the authorization of these resorts, such as: the quality of infrastructure services, equipment, qualified medical staff, accommodation facilities and the existence of certain therapeutic factors, criteria which are necessary in order to acknowledge this status. Thus, the government counsellor states that: "all these resorts fulfil the basic conditions, such as: therapeutic factors, treatment bases and accommodation facilities", facts which also stand true in the case of Vatra Dornei resort, which is situated at present on the list of the main resorts in Romania.

*The economic factors*, equally determined by the number of commerce and production units, the existing working places or the level of economic development in a certain area or town, represent an important prediction "barometer" of the population's health state in general and of the investments in the medical system in particular. Out of the total number of economic units existing in the superior basin of the Moldavian Bistrita river, four of them ranked in top 100 at the end of 2011 from the turnover point of view; in Suceava county (table 1), two of them, Dorna SA and Carpathian Springs SA have the mineral water exploitation as their field of activity.

*Table 1. The main business units in turnover Top 100*

No. crt.	Name unit	Top 100 by turnover in 2011	City	Turnover
1	DORNA LACTATE.SA	2nd place	Dorna Candrenilor	185 200 945
2	DORNA S.A	6th place	Vatra Dornei	104 414 981
3	COLOANA PRODCOM S.R.L	44th place	Vatra Dornei	28 935 264
4	CARPATHIAN SPRINGS S.A	84th place	Vatra Dornei	17 037 026

*Sours: Statistical Yearbook of Suceava District - 2012, National Statistical Institute București, Statistical Office of Suceava District*

#### *The health system.*

According to the Centre of Health Politics and Services (2006), a health system is represented by an ensemble of elements which interact in order to ensure the health state of the individuals in a community, having as main components: the production and development of resources, their organization in different functional relations oriented towards the production of services, providing services, management and finance. Each system is functional only in the presence of the three great "actors": the medical services provider (in our case the treatment bases in Vatra Dornei and Dorna Arini), the customer (all age categories) and the payee (the health assurances or individual payment, where necessary.)

Thus, between 2005 and 2011, the number of treatment tickets provided by the state social assurances in Vatra Dornei resort, varied from 8,493 tickets in 2005 to 7,806 in 2009, with a rise up to 9,168, according to the graphic (Figure 1).



Figure 4. Tickets treatment given by state social insurance in Vatra Dornei,  
Source: Statistical Yearbook of Suceava District, 2012

#### *The individual factors (bio-psycho-social)*

Starting from the definition given by OMS, in the diagnosis of the health state we must take into consideration the three-dimension unit that is the bio-psycho-social element of the individual. From this point of view, Oliver de Ladoucette identifies, for each of the mentioned units, a series of independent variables (or determinants) which can accurately explain, at a high level of probability, the positive or not influence of all these individual factors on the population's health state. Thus, for the genetic factors, susceptible of influencing and determining an individual's health, the author mentions the gender factors (most of the time reacting differently to the environmental factors, women being, as it seems, more predicted to health problems than men). Then certain genes and chromosomes are responsible for certain hereditary diseases, for our resistance to the most frequent diseases (cancers, Alzheimer malady, cardiovascular affections), for the intelligence level (the studies show that intelligent people live more due to a correlation between the mental and the physical state, which consolidates in time) and, last but not least, for diseases related to age, like osteoporosis, diabetes, some cutaneous affections. In addition, the author considers that many of the anatomical and physiological modifications, wrongly considered responsible for getting old, are in fact the result of an insufficient use of the body's resources, of the stereotypes and the prejudices related to age (the classic example of those retired people who adopt the image of "the old person" from conformism) or even of the "generation effect", the historical hardships of a generation.

As to the psychological factors, these are extremely numerous and complex, sometimes difficult to be measured and quantified, but very important in determining the general health state. Thus, among these factors, the most notable are: personality, a specific state of mind, optimism, confidence, anxiety, sedentary life (physical and intellectual), responsibility, egocentrism, hostility and fury, emotional balance, long exposure to stress, control over one's own life, compassion and altruism, feeling useful and, of course, life style.

As regards the "repetitive behaviour type, conditioned by culture, life standard, under the limited control of the family and of the individual, within the limits of their economic resources", the life style is represented by those behaviours which are favourable or not to health and longevity. Centenarians often associate health with certain "recommended" behaviours, such as not smoking, drinking moderately or not at all, practising sport regularly, having regular meals, sleeping enough, having a various diet etc. Oliver de Ladoucette also adds to these factors the socio-professional and economic status of the individual (poverty being often associated with a precarious health), the education level, the quality of interpersonal relationships, social isolation, antidepressives, the adaptability to the

environment, the relation with spirituality, the marital status and life in the couple, social supports with direct effect on health.

Other French authors, like Sebastian Fleuret (2002), pay an important attention to the “social environment” in which we “build social relationships which are important for health and wealth”. Sarah Curtis speaks about the differences regarding the cultural and social representations in therapeutic places, while Wakefield and Mullan (2005), quoted by the above mentioned author, show how perceptions on therapeutic territories are conditioned by the social position of the respondent, location (internal or external) and favourable “stories” about these places. For example, the negative aspects of certain places are often built by those from the outside, the local citizens having a more positive outlook on their town.

At the same time, Tihan E. (2004) thinks that “some people don’t admit the fact that they are sick, while others do not want to recover: some of them do not want to do anything, while others are tempted, through diagnosis, to do all that is possible...” Furthermore, Doris Manea (2006) states that “a geographical area can be situated at the top of the life quality scale, but the individuals living there could say they are unsatisfied with their lives”, and Sebastian Fleuret thinks that these objective conditions can generate different wealth levels from one generation to another.

Diversity, the main characteristic of the human population (Muntele, I., 2006) acts upon the representations and evolutions an individual achieves in time and space on the basis of therapeutic factors in general and health in particular, through a straight pragmatism, even princely on the phenomena which include, at different levels, the redundancy of the gathered information. Thus, the incidence of the main chronic and infectious diseases in Vatra Dornei and the neighbouring places can be noticed in figures 2 and 3.

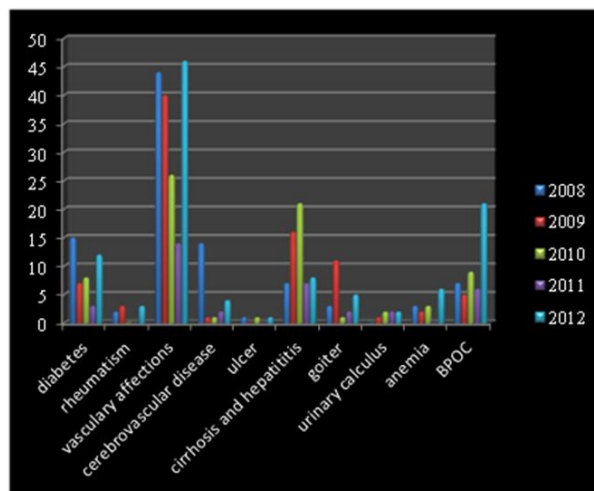


Figure 5. The incidence of the chronic diseases in Vatra Dornei and surrounding towns:  
Source: Department of Public Health Suceava

As regards the presence of chronic diseases, according to the data from the Public Health Direction of Suceava, it results that between 2008-2012 there was a high incidence of hyper blood pressure, chronic obstructive broncho-pneumonia, diabetes, goitre, cirrhosis and hepatitis and a smaller incidence of articulatory rheumatism, vascular affections, ulcer, anaemia etc.

The fact that until recently Vatra Dornei has been associated to rheumatism affections was not due to the high incidence of this disease in the area but rather because of the therapeutic practices used in the treatment bases in the prophylactic and curative sense and, of



course, because of the social and cultural stereotypes related to the resorts in general and the affections treated here in particular.

Considered as one of the “material comfort diseases”, for the period 2008-2012 hyper blood pressure registers the highest values, namely 44 new cases in 2008, 40 in 2009, 26 in 2010, only 14 new cases in 2011, and 46 in 2012.

A high incidence was also recorded in the case of broncho-pneumonia (from 7 new cases in 2008 to 9 in 2009 and 21 in 2012), followed by chyrrosis, hepatitis (with 21 new cases in 2010, but decreasing to 8 cases in 2012) and diabetes, with a fluctuant incidence (15 cases in 2008, 7 in 2009, 3 in 2011 and 12 in 2012); rheumatism, anaemia, rickets, mental disorders, nephropathies, etc. have a very low incidence (under 4 new cases a year) in the case of the population of Vatra Dornei.

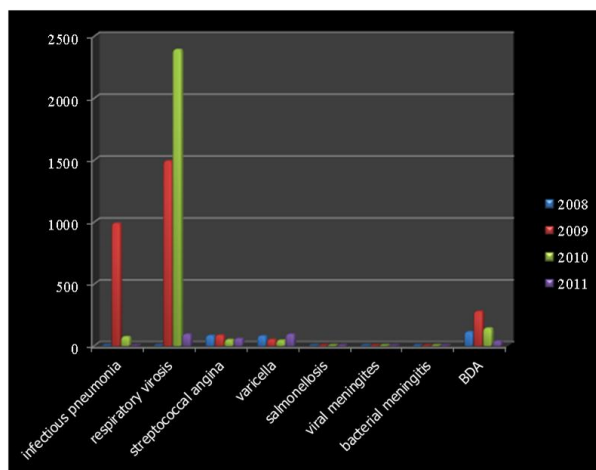


Figure 6. Evolution of infectious diseases in Vatra Dornei Source: Department of Public Health Suceava

Analysing the total number of infectious diseases (about 41) registered and supervised by the Public Health Direction of Suceava, one can notice a high incidence in Vatra Dornei of such affections as: respiratory virosis, infectious pneumonia, chickenpox, angiopathy, digestive problems and, to a small extent, infectious meningitis, dermatosis, scarlet fever, toxoplasmosis, encephalitis, etc. The most dominant affections are the respiratory and digestive ones, a consequence of both climatic factors (for the first type of affections) and a diet rich in animal proteins, as it seems (for the second category of affections).

Thus, if the respiratory virosis registers a record incidence in 2010 (2,392 new cases), in 2011 their incidence decreases to 94. Even so, we cannot say exactly the real cause of this diminishing incidence of these affections; this may happen because they are not exactly registered in medical registers or they are registered under different names. The same situation occurs in the case of the infectious pneumonia: in 2009 there were 990 new cases, the next year 74 cases, while in 2011 we found 0 cases. The incidence of circulatory diseases varies from 278 new cases in 2009 to 143 in 2010 and to only 38 in 2011. For chickenpox, the year 2011 registers the biggest number of new cases, 94, compared to only 44 in 2010 and 51 in 2009. In the case of the other affections, such as meningitis, salmonellosis, dermatosis, encephalitis, the incidence is extremely low, under 5 cases a year.

The centralization of data regarding the incidence of the infectious diseases, as made by the DSP Suceava, was achieved until 2011 at the town level too but, starting with 2012 it began to be made at the county level that is why we cannot compare the evolution of these affections during the last two years.

#### 4. Conclusions

Given the conditions, the special balneary cures become, on one hand, valuable remedies with prophylactic, therapeutic and recovery effects, and on the other hand an alternative to the therapy based on medication (most of the time at high costs, with limited or side effects.)

The natural and anthropogenic factors determine “in corpore” a community’s health state, thus the exacerbation of the natural and/or human determinism can undermine the comprehension of the phenomenon in general and of the processes that generate it in particular, the cryptic character being rather explained and explicable through the confirmation of the nomic principle, the scientific postulates and syncretism specific to the studied phenomenon.

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