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DEVELOPMENT OF SPECIES AND PROCESSES OF THEIR LIFE SUPPORT THROUGH THE PRISM OF NATURAL EVOLUTION AND EXPEDIENCY

Peer-reviewed materials digest (collective monograph) published following the results of the LXXVIII International Research and Practice Conference and I stage of the Championship in Medicine and Pharmaceutics, Biology, Veterinary Medicine and Agriculture (London, March 21 – March 26, 2014)



IASHE



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CONTAMINATION OF DRINKING WATER: PEASANTS' CONTINGENTS
SOCIOLOGICAL SURVEY

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Conference participants,
National championship in scientific analytics,
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For retrospective survey until 2011–2013 years the standardized questionnaire was designed for interviewing peasants in the settlements (experimental group) and inhabitants of an industrial city Dnipropetrovsk (control group) - 90 respondents from each group. Information about quality of piped potable water that enters the building (apartment) were requested from the all questionnaires. The data obtained in the study showed low awareness among peasants contingents: 26.07 % of interviewing doesn't consider quality of potable water is a hygienic problem; 22.26 % were not decided yet if they are satisfied with the quality of tap water. Therefore, 14.81 % of peasants were sure that they use poor quality potable water; 25.25 % of questionnaires associate poor quality of tap water mainly with rust and sediment, 19.57 % with turbidity ($p < 0.001$). After collecting questionnaires from 180 contingents (90 from experimental and 90 from control group) new data will be used for further scientific research in the field of potable water supply and management decisions in order to improve quality of piped potable water in the peasants contingents, and introduction modern methods of purification in the rural settlements, which are not covered by centralized water supply, mainly, from 5.8 % to 39 % peasants contingents in the region.

Keywords: *peasant contingents, quality of piped potable water, potable water additional purification, retrospective survey, centralized water supply.*

Purpose of work is collection of the detailed information about quality of tap water entering the building (apartment), using by population living in the rural settlements and in the industrial city Dnipropetrovsk.

Material and Methods. Quality of potable water, entering into the building, were carried out by sociological survey on the 90 interviewing peasants in the settlements (experimental group) and 90 inhabitants of an industrial city Dnipropetrovsk (control group). The lowest rates of coverage by piped water supply were in the Pavlohradskyi (5.8 %), Tsarichanskyi (26 %), Petrikovskiyi (39 %), Petropavlovskiyi (33 %) regions. Therefore, experimental settlements were based on the low coverage peasants in these rural regions by centralized water supply and predominantly presence of decentralized and imported water. Standardized interviews 'Potable water quality, that enters to the building (apartment)', contained 18 issues have been performed from 2011 to 2013 year. There were used methods: retrospective study, sociological, statistical. Achieved sociological data was carried out with using programs „Microsoft Office Excel 2003” and „SPSS”.

Results and Discussion. Among peasants 28.86±17.20 % used for drinking purposes tap water without treatment, whereas among inhabitants 1.50±0.37 %. Additionally cleaned potable water as expected, exposure peasants' contingents: 16.38±10.29 % prefer boiling (as well as 6.07±4.71 % of urban population); 13.33±7.28 % apply advanced treatment of potable water for domestic filter (compare with 20.48±0.38 % city questionnaires); 33.87±16.7 % of interviewing are closed to 'inside house filter' (against 20.56±0.31 % city contingents); 17.62±9.40 % of peasants use water from a pump room, or wells (as well as 4.42±4.03 % city inhabitants); 48.27±16.22 % among interviewing peasants continue provides packaged potable water (in comparison with 11.02±5.68 % residents of the control group); 21.01±10.99 % and 7.44±5.18 % of all questionnaires in both groups estimates good quality of potable water from the points of a spill. However, the corresponding values in both groups were 25.62±4.66 % and 10.21±2.88 % among exposed contingents ($p < 0.05$). Problem of poor quality tap water was assessed by 17.27±6.06 % population in the settlements and 5.58±2.45 % of inhabitants in the control area ($p < 0.001$). Another answer was collected in both groups of interviewing 26.07±16.55 % (experimental group) against 20.55±0.40% (control group), which described problem of piped potable water as well as relevant. In general, 19.67±13.35 % of peasants in comparison with 10.05±0.63 % inhabitants of industrial city Dnipropetrovsk indicated that the problem of potable water is not relevant; though 21.43±10.55 % (against 6.45±4.76 %) of questionnaires due to our data reports that this issue is relevant. The interviews have been performed mostly with peasants' contingents shown that 5.46±2.92 % of local population and 14.27±6.96 % of urban residents consider potable water quality to be important hygienic problem.

Among questionnaires who were underwent: 12.46±1.53 % respondents in an experimental group (against 13.82±6.78 % in control group) estimated quality of tap water as good quality (constantly satisfactory quality) – 9.59±8.01 % to 0.54±0.39 % subjects in both groups. Conditionally quality (periodically are not satisfied for certain indicators) in the follow-up groups has been conducted 12.97±6.22 % of the local peasants (against 18.05±9.05 % interviewing in control group). Poor quality (constantly unsatisfactory quality) potable water has been approached by the interviewer 14.81±7.24 % (settlements) against 22.85±12.82 % (industrial city). Majority of peasants connected poor quality of potable water: 25.25±2.82 % with rust, sediment; 19.57±3.46 % with rigidity; 15.55±9.53 % with color ($p < 0.05$); 13.59±7.24 % with smell; 12.32±6.30 % with taste. In 2011–2013 years, we have collected self-administered questionnaires from 90 participants in the retrospective study, which have been located in Dnipropetrovsk city. In the sociological survey 24.31±2.53 % of residents showed that the first ranking position in the field of study takes poor taste – 24.31±2.53 %; second rank belongs to the rigidity – 20.11±9.89 %; in the third place, respondents indicated smell – 20.04±11.28 %. Statistically significant was the color of potable water, which was given by 18.94±9.71 % of the city citizens, as well as turbidity 16.69±8.76 % and other indicators, such as rust, sediment – 2.61±0.43 % ($p < 0.05$). 22.21±2.76 % of rural population against 19.33±1.96 % of urban residents have been filled, that quality of potable water connected with the following diseases in their family: kidney stones, gallstones, cardiovascular disease, anemia, allergic diseases ($p < 0.001$) (Figure 1).

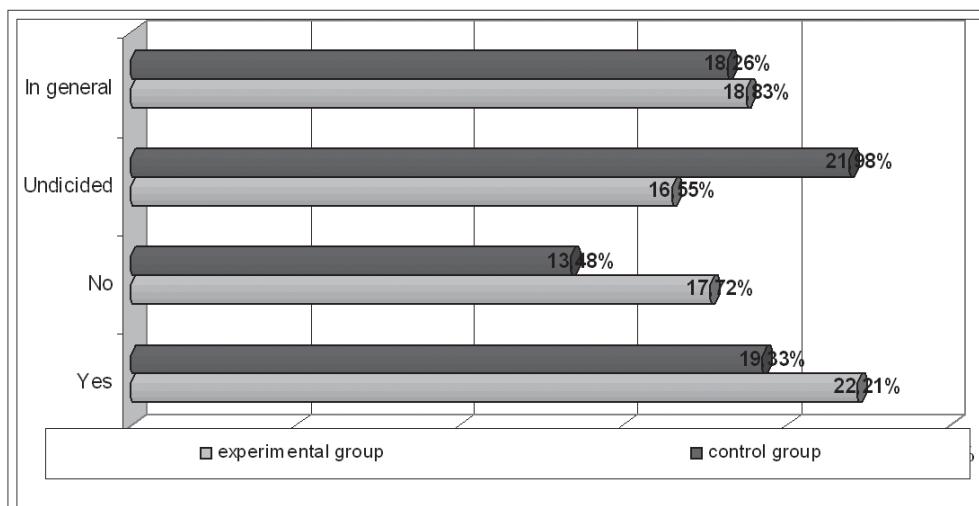


Fig. 1. Respondents' answer to the question „Do you connect diseases in your family with potable water quality?”

Our study provides high degree of awareness population of Dnipropetrovsk city, as $19.23 \pm 10.00\%$ dealing with filters, against $14.93 \pm 7.55\%$ peasants' contingents, others prefer collective system - $17.93 \pm 9.51\%$ (experimental group) and $17.61 \pm 8.98\%$ (control group) ($p < 0.001$). Frequency of using filters was the great among inhabitants of industrial city, majority of them prefer filters of the firm „Brita” $86.26 \pm 5.28\%$ ($p < 0.001$). Second ranking position occupy filters-produced by Czech manufacturers $76.90 \pm 12.08\%$ ($p < 0.05$); third place take filters of the firm „Barrier” $69.70 \pm 2.27\%$ ($p < 0.001$). About $54.97 \pm 0.66\%$ of rural respondents dealing with filters of various companies, while $52.73 \pm 0.92\%$ of city interviewing, taken into consideration municipal purification of potable water, didn't use any filters. In general, respondents from control group, who was covered by municipal water supply system – $23.80 \pm 0.65\%$, were not carried out any filters. Among population in the local settlements of Dnipropetrovsk region the first rank belongs to filters of firm „Barrier”, as noted $22.73 \pm 2.03\%$ of peasants ($p < 0.001$). Second rank place takes filters of the German manufacturers („Tefal”, „Bosch”, „Zepter”), as suggested $15.27 \pm 2.38\%$ of peasants ($p < 0.05$); minority of respondents are covered by filters of the firm „Aquaphor”, according to a survey – $13.90 \pm 0.89\%$. Most peasants ($42.16 \pm 5.56\%$) used such methods as boiling, handling of potable water with silver, as well as adults' population in Dnipropetrovsk city ($24.85 \pm 12.36\%$) carried out improvement of water treatment technologies (Figure 2).

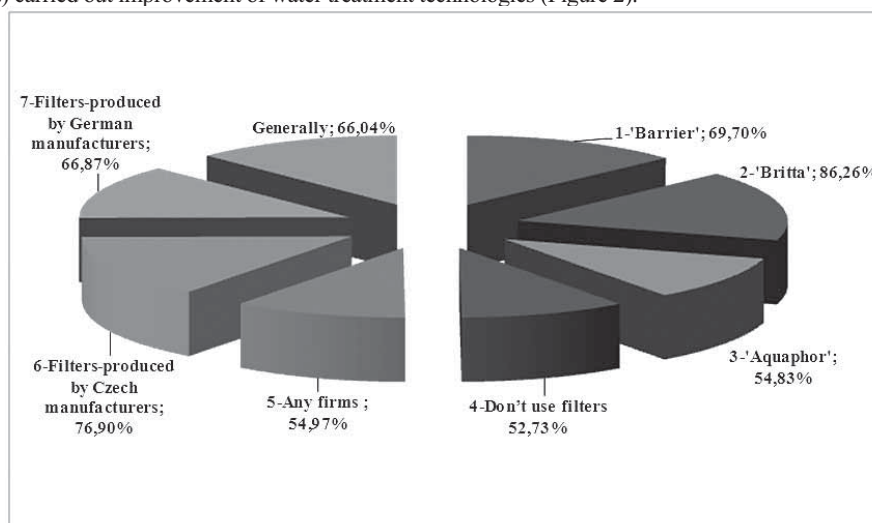


Fig. 2. Peasants' population, who underwent the baseline examination, has been conducted to the question „Whether you prefer filters for water treatment purposes?”

Data obtained in the sociological study showed that $45.34 \pm 0.36\%$ peasants' contingents select a filter by filtration capacity and resource of this filter, against $17.59 \pm 0.68\%$ respondents from control group ($p < 0.05$). Predictor factors, which influence into the choice of the given filter, were: media regarding about unsatisfactory quality of potable water from (38.30 ± 0.26 to 11.10 ± 0.91) %; data based on the analysis of potable water (38.21 ± 0.58 – 7.92 ± 0.48) % in both groups respectively ($p < 0.001$). One of the most popular ways was advice of friends, relatives, advertising firms-manufacturers at the choice of a sewage filter: $32.07 \pm 0.38\%$ (experimental group) and $15.47 \pm 0.76\%$ (control group) of interviewing. Other sources, choosing filter, guided $21.39 \pm 0.38\%$ and $12.94 \pm 0.37\%$ of the respondents.

The largest effect has been found in $45.56 \pm 0.49\%$ of rural residents, who drink potable water goes through reverse osmosis ($p < 0.05$). Cleaning of ion-exchange resins at their filter covered $24.95 \pm 0.21\%$; ultraviolet irradiation - $11.67 \pm 0.67\%$ and activated charcoal cabin filter prefer only $7.64 \pm 0.73\%$ of peasants. The whole distribution of purification methods in the control group was shifted in the given measures: the first rank place takes a charcoal filter ($47.75 \pm 0.72\%$); next one was devoted to other stages of purification ($10.78 \pm 0.33\%$) ($p < 0.05$). The smallest effect has been observed in $8.14 \pm 0.01\%$ of the city dwellers ($p < 0.05$). Second part of the study has been carried out to variables cleaning of filter elements, which has been supported by the smallest part of rural population ($9.58 \pm 0.25\%$) and the largest one of city inhabitants ($27.26 \pm 0.53\%$).

Interpretation of the study results among city dwellers showed, that only $6.76 \pm 0.33\%$ of inhabitants were not significantly changed filter elements ($p < 0.05$), or sometimes replaced replaceable filter elements about $17.70 \pm 0.98\%$ of interviewing (control group). Every 23 peasant,

i.e. 20.60 ± 0.12 % underwent the baseline examination and every 19 city dweller, i.e. 17.24 ± 0.92 % ($p < 0.001$). It was established, that re-purified potable water for drinking purposes used 27.26 ± 0.53 % of peasants, as well as 52.60 ± 0.50 % of city inhabitants ($p < 0.05$). Potable water for drinking purposes statistically significant used 27.26 ± 0.53 % interviewing peasants, as well as 52.60 ± 0.50 % of respondents in the Dnipropetrovsk city ($p < 0.05$). For cooking and other purposes has been conducted 12.61 ± 0.42 % (experimental group) and 44.86 ± 0.09 % (control group) respondents ($p < 0.001$). In general, an adult population, who underwent the baseline examination in 2011 – 2013 years, include 44.86 ± 0.09 % of peasants and 42.38 ± 0.48 % of city contingents, among respondents which follow-up this question ($p < 0.001$). Most peasants (42.16 ± 5.56 %) used such methods as boiling, handling of potable water with silver, as well as adults' population in Dnipropetrovsk city (24.85 ± 12.36 %) carried out improvement of water treatment technologies (Figure 3).

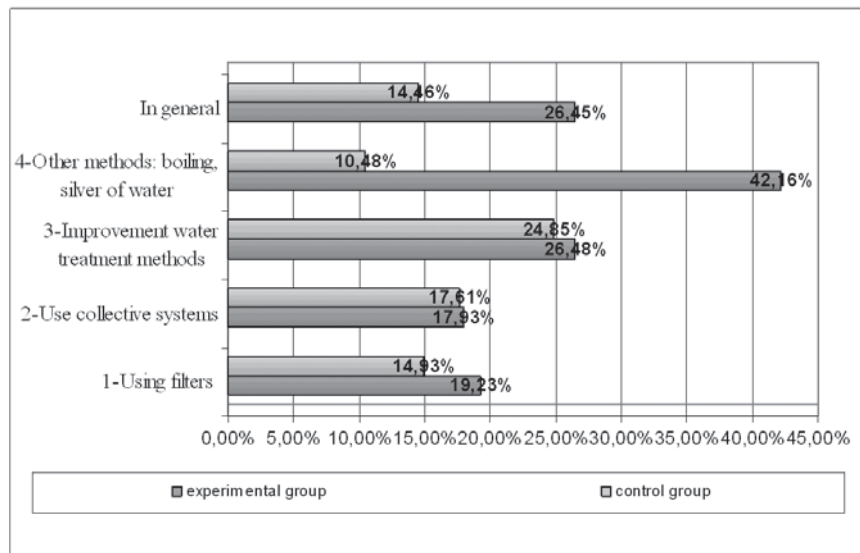


Fig. 3. Questionnaire of interviewers „Which measures to improve quality of potable tap water is most preferable?”

Conclusions. The follow-up surveys have followed the baseline cross-sectional study among interviewing in the settlements (experimental group) and inhabitants of an industrial city Dnipropetrovsk (control group) during 2011-2013 years. In total, problem of good-quality potable water was not priority for 26.07 ± 16.55 % interviewing in respect to low awareness of peasants. 22.26 ± 12.82 % peasants didn't know whether satisfied with the quality of tap water, but 14.81 ± 7.24 % clear characterized potable water as poor-quality. Poor-quality of potable water was link with follow-up reasons: organoleptic criteria's as well as rust and sediment (25.25 ± 2.82 %), turbidity (19.57 ± 3.46 %). The largest effect 22.21 ± 2.76 % of peasants link with available in their family illnesses such as increasing cases of kidney concerns and urethral calculus (N20-N23) in the experimental districts, carcinogenic tumors (C00-C97), hypertensive illness (I10-I15), ischemic illness of heart (I20-I25), anemia, allergic diseases, etc. ($p < 0.001$).

Majority of peasants' population in the experimental districts (Pavlohradskiy, Tsarichanskiy, Petrikovskiy, Petropavlovskiy) covered with centralized water supply and predominantly presence of decentralized and bottled water. Interviews were collected from the given respondents have been shown additional purification as the best possible way in respect to improve potable water quality. According to the data of follow-up study, 42.16 ± 5.56 % of peasants used boiling as well as purification method; 23.80 ± 0.65 % interviewing in the local settlements have never used water-purifying filters; 27.96 ± 0.55 % peasants applied filter from time to time; 91.67 ± 0.88 % rural residents are not satisfied exploitation of the filter; 32.08 ± 15.82 % focused on the addition purification methods, except filtration ($p < 0.001$). After collecting questionnaires from 180 respondents ($n=90$ in both groups) new data will be received in order to improve quality of piped potable water in the local settlements, as consider from (5.8 to 39) % of peasants, and increase awareness among rural population. The field study has been performed in 2011-2013 years will be the basis for the second follow-up study in respect to cause-effect poor quality potable water and health of the peasants, carried out non-carcinogenic and carcinogenic risks in the local settlements, which are not covered by centralized water supply, mainly, from 5.8 % to 39 % peasants contingents in the Dnipropetrovsk region.

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