

Water for the Displaced Population's Health: An Urban - Rural Dichotomy Revisited

Alpaslan Özerdem & Sultan Barakat

Abstract

This paper is a review and analysis of the health impacts of inadequate and unsafe water supplies on displaced populations. The investigation focuses on the overall health implications of the current praxis of water supply recovery and reconstruction, which is often biased towards urban areas, neglecting the water needs of those living in rural areas. Having explored a series of water quantity and quality issues, and their inter-relationship to public health, by comparing urban and rural settlements in the Tuzla Region of Bosnia-Herzegovina, this paper concludes that the overall strategy of responding to water needs of displaced populations requires equal attention and care to both urban and rural areas.

Résumé

Cet article propose un récapitulatif et une analyse de l'impact sanitaire d'une distribution inadéquate et insécuritaire de l'eau chez les populations déplacées. La recherche concentre son attention sur l'impact sanitaire global des pratiques actuelles de distribution des eaux, qui privilégie souvent les zones urbaines au détriment des zones rurales, dont les besoins en eau potable sont sciemment négligés. On explore un certain nombre de questions relatives à la quantité et à la qualité de l'eau, et leur relation avec la santé publique, en comparant des instal-

lations urbaines et rurales de populations déplacées de la région de Tuzla, Bosnie-Herzégovine. L'article conclut que la stratégie globale visant à répondre aux besoins en eau potable des populations déplacées doit être aussi attentive et minutieuse en zone rurale qu'en zone urbaine.

Introduction

Water is not only significant for our very existence, but also for the continuation of physical, social and economic aspects of everyday life. Without adequate means of water, the development of society and satisfaction of human aspirations cannot be managed. Since there is no substitute for water, humanity's existence totally depends on it. In fact, it is water's indispensable multi-functional character for life - health, habitat, carrier and production functions - which is why water is often used as a weapon of war.

Vulnerability of water supplies, particularly those in urban areas due to their complexity is often manipulated by warring parties in armed conflicts: destruction inflicted on water supply components by bombing and artillery; cutting off or poisoning of water sources when they are in the hands of opposing side. Armed conflicts have also great indirect negative impacts on water supplies, as the interdependence on electricity and fuel for their operation makes them very vulnerable to war conditions. The other indirect effect of war on urban water systems is the lack of personnel, materials, equipment and chemicals for their operation and maintenance. Even if they are obtained through great efforts, the lack of personnel may still pose a great challenge for the improvement of supplies. Water board staff may be under conscription or they might be ethnically cleansed and displaced, injured or dead (Özerdem, 1998).

As a result of these direct and indirect impacts of armed conflicts on water supplies, war-affected communities go through the burden and hardship of

lacking adequate supplies of safe water for their well-being and health. Besides the scope of these challenges with water quantity and quality in settlements affected by armed conflicts, the influx of refugees and internally displaced persons (IDPs) further exacerbates the situation. These influxes of displaced people, which increase the demand for water in a settlement sometimes by 10 to 20 fold, put tremendous strain on damaged and already inadequate existing supplies. Consequently, both host communities and those displaced from their homes and livelihoods often experience deadly health problems caused by water-related infectious diseases (Özerdem & Barakat, 1997).

The literature in public health studies and the health care for war-affected people usually state the classification of water-related infectious diseases according to their transmission routes as (Feachem, et al., 1977; Dangerfield, 1983; WEDC, 1991; Mears & Chowdhury, 1994; Kolsky, 1993; Thomson, 1995):

1. Water-borne route: The infection occurs by drinking water containing pathogens.
2. Water-washed route: The infection in this group caused by the lack of water for personal hygiene.
3. Water-based route: Some pathogens spend a certain part of their life cycle in an aquatic animal such as a water snail and infection occurs by coming in contact with parasitic worms.
4. Insect vector route: Water in this route acts as a breeding ground for insects which spread diseases.

Table 1 shows these four water-related transmission routes with examples of diseases and preventive strategies. What can be derived from the preceding table is that many infectious diseases such as diarrhea, dysentery and cholera can be prevented from causing the deaths of thousands of war-affected people by increasing and improving water quantity and quality. According to Kolsky (Kolsky, 1993), the

Dr. Alpaslan Özerdem is a civil engineer from Turkey. Dr. Özerdem is currently working as a research and teaching assistant at the Post-War Reconstruction and Development Unit (PRDU), University of York, UK.

Dr. Sultan Barakat is an architect from Jordan. Dr. Barakat is the founding director of the PRDU and has extensive experience in conducting in-country training, research and publication in the field of rebuilding war-torn societies.

Table 1: Water-related infection routes with examples and control measures
(Source: WEDC, 1991:70 and Dangerfield, 1983:27-28)

Transmission route	Example	Preventive Strategy
Water-borne	Diarrheas, dysenteries, cholera, typhoid	Improve water quality Prevent use of uncontrolled sources <u>Hygiene education</u>
Water-washed	Infectious skin and eye diseases, louse-borne typhus	Increase water quantity, accessibility, reliability <u>Personal hygiene education</u>
Water-based	Schistosomiasis, guinea worm infection	Water quality & quantity Control snail population <u>Excreta disposal control</u>
Water-related insect vector	Sleeping sickness, malaria, yellow fever	Improve surface water management and surplus water drainage <u>Destroy breeding sites of insects</u>

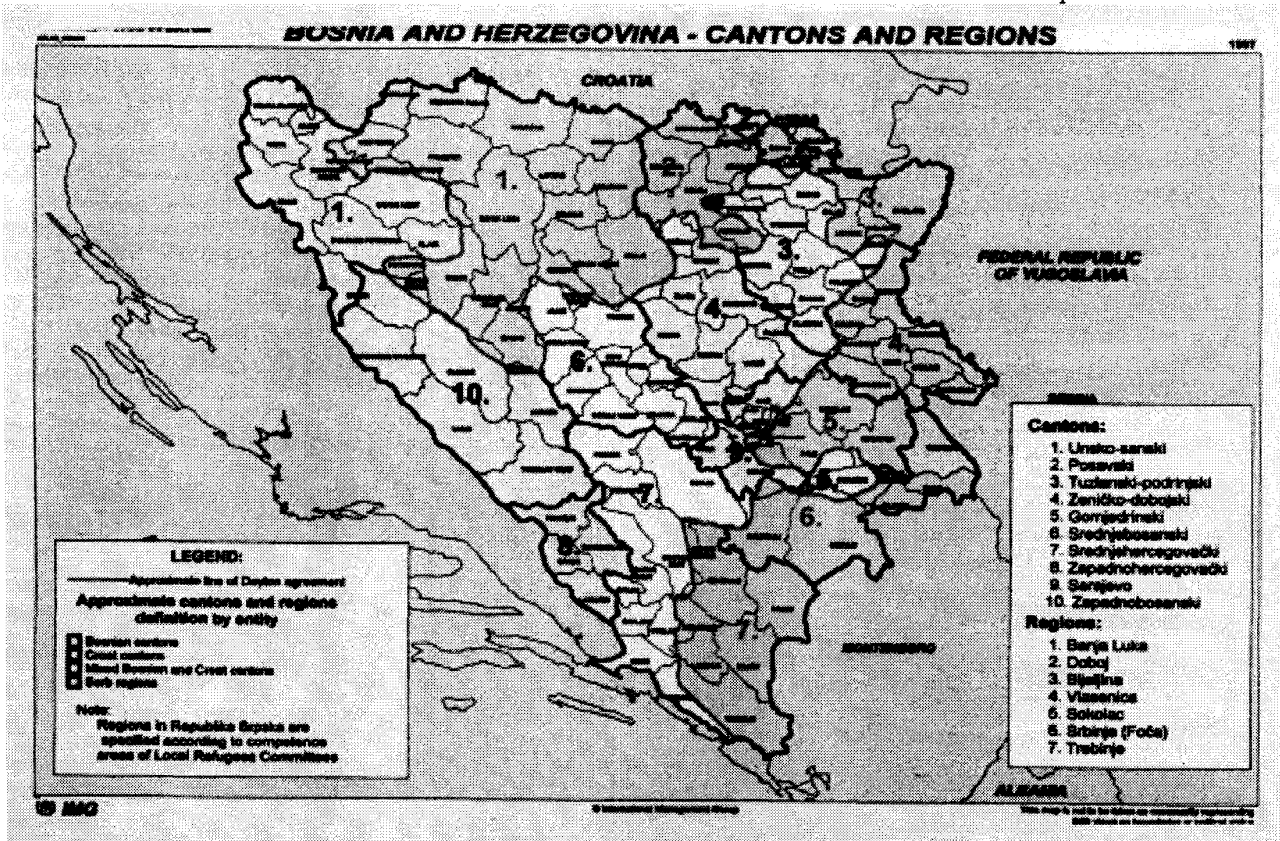
preceding categorisation of water-related infectious diseases was especially appreciated by engineers, as it outlines a preventive strategy for each transmission route. For example in Table 1, the improvement of water quality was given as an appropriate intervention for water-borne diseases and increasing the quantity for the water-washed. However, it is difficult to claim a single trans-

mission route for diarrhoeal diseases as both water-borne and water-washed routes play a significant role in their infection. As a result of this, Bradley and Feachem proposed the following classification:

1. faecal-oral diseases (water-borne and water-washed)
2. strictly water-washed diseases (skin and eye infections)

3. water-based
4. water-related insect vector

The engineering approach underlined by Kolsky, which considers water provision only in terms of pumps, pipes, volume and chlorine, also highlights another problematic area with the current praxis of responding to water needs: the difficulty of physically meeting the water needs of displaced persons. Various assumptions and biases,



such as being able to eradicate all water-related diseases by only improving water quality, or focusing on urban areas at the expense of those living in settlements which are not covered by an umbrella of a water supply system complicate the situation. Therefore this paper will review a series of water quantity and quality issues, and their inter-relationship to public health through an urban-rural injustice discourse in the context of the Tuzla Region of Bosnia-Herzegovina in order to derive a set of lessons to be utilised in responding to water needs of people in other war-affected areas .

The Tuzla Region Context

The Tuzla Region of Bosnia-Herzegovina is located approximately 90 km north of Sarajevo, and includes the municipalities of Banovic, Brcko, Celic, Doboj East, Gracanica, Gradacac, Kalesija, Kladanj, Lukavac, Sapna, Srebrenik, Teocak, Tuzla and Zivinice. The Dayton Line separates the Tuzla Region from the Serbian regions number 2, 3 and 4 along its west, north and east sides, while in the south, it borders with the Muslim Canton number 4, as can be

seen on the map on p.17. In each municipality of the region, there is a centre town which is the main settlement for administrative, economic and social activities and gives its name to the whole municipality such as Lukavac, Tuzla and Zivinice towns in their respective municipalities. Besides these centre towns in each municipality, there are also a number of smaller towns and villages, and it is in conjunction with this administrative structuring that the first layer of urban - rural dichotomy appears at the intra-municipality level. However it should be noted that there are also distinctive differences in economic development levels at the inter-municipality level. For example, Tuzla, Srebrenik and Gradacac municipalities have much better physical, economic and institutional resources than in Aelic, Kalesija and Teocak. In addition to this, as a result of the Cantonal System in the Federation of Bosnia and Herzegovina, Tuzla town also has the role of being regional capital city, as is the status for Zenica in Zenickodobonjski Canton (Number 6) and

Mostar in Srednjehercegovački Canton (Number 7), which means a further concentration of administrative and institutional structures in its boundaries.

The Tuzla Region preserved its multicultural and multi-ethnic characteristics for centuries under the rules of different empires from the Ottomans to the Austria-Hungary Empire. Although it was mainly a Muslim region - 65% of the population in 1991- the Croats and the Serbs formed a considerable proportion of the population in municipalities such as Brcko and Tuzla. There is no doubt that the war changed the demographic composition in the municipalities, both in terms of population and ethnicity, through its severe impacts such as ethnic cleansing and mass population movements. According to the United Nations High Commissioner for Refugees (UNHCR 1997), there are 200,000 Muslim IDPs living in the Tuzla Region. However, apart from estimating some approximate numbers and percentages, it is not an easy task to estimate the current ethnic breakdown for each municipality.

Table 2 shows that the municipalities of Gradacac and Lopare experienced a considerable level of displacement in terms of receiving refugees and IDPs, as well as having people displaced from their boundaries, due to their geographic positions between the Federation of Bosnia - Herzegovina, and Republica Sirpska. On the other hand, the main displacement experienced by Lukavac and Tuzla had been in terms of receiving mainly Muslim IDPs from other parts of Bosnia-Herzegovina. For example, IDPs form 25 % of the current population in the Tuzla Municipality. More importantly, it can be seen that, as a consequence of Muslim IDPs, the proportion of ethnic groups has changed considerably. Even assuming that the population of Croats and Serbs remained the same during this period, the ratio of the Muslims in the Tuzla Municipality increased from 48% to 65% (Ozerdem,1998).

Table 2: The pre-war and post-war population and ethnicity in four sample municipalities

		GradaCac			Lopare			Lukavac			Tuzla		
		B	C	S	B	C	S	B	C	S	B	C	S
Pre-war POP.	Total	56,581			32,537			57,070			131,618		
1991	%	60	15	20	37	4	57	66	3	21	47	15	15
Current	Fed	38,600			19,500			51,200			159,718		
Population & Major Ethnicity	Major ethnicity	6,900			20,200								
	Major ethnicity	RS			B			B			B		
Refugees	Fed	min250			---			min660			min2.300		
From Displaced Persons	Major ethnicity	C			B			B			B		
	Displaced Persons	4,400			1,400			7,500			41,200		
Persons in	Major ethnicity	RS			B			B			B		
	Major ethnicity	C			B			B			B		
	Persons in	2~600			4,800								

B: Mainly Bosniacs, C: Mainly Croats, S: Mainly Bosnian
 min: minimum
 Fed: Federation of Bosnia-Herzegovina AS: Republica Sirpska

The Provision of Drinking-Water in the Tuzla Region

A survey carried out by Jusupovic and Beslagic (1998) from the Tuzlanski-podrinjski Cantonal Ministry of Health and the Cantonal Public Health Institute respectively, presented the current situation of water supply and drinking-

Table 3: State of Water Supply in Tuzla Region 1998
(source: Jusupovic and Bešlagic, 1998:116)

Municipality	% of inhabitants with connections to city water networks	Water consumption (litres/ inhabitant/ day)	% of deteriorated water supply network
Banovici	10	50 - 230	25
Brcko	-	-	-
Belic	-	-	-
Doboj East	-	30	16
Gracanica	32	150	57
Gradacac	22	150	80
Kalesija	25	20	-
Kladanj	-	-	-
Lukavac	28	250	20
Sapna	-	-	-
Srebrenik	14	140	-
Teocak	-	-	-
Tuzla	67	200	-
Zivinice	44	150	-

-: no data

water quality control in the Tuzla Region.¹ The following data obtained from this survey are presented in table 3. This table shows the percentage of municipalities with service connections to city waterworks, their water consumption, and the percentage of deteriorated city water supply networks.

This table shows that the level of service connection to existing urban water supplies is very low in the Tuzla Region. The Tuzla municipality has the highest proportion of its population, connected with the water supply network, while it is as low as 10% in the municipality of Banovici. However, the percentages provided show the ratio for the number of inhabitants with connections to city water networks by municipality. However, it is known from the field work that the percentages for the population living in town centres are much higher than those in rural areas. For example in Gradacac, Gracanica, Tuzla and Zivinice town centres, almost all populations are served with water by town water supply networks. The variation of water consumption from one municipality to another is large: over 150 litres per capita per day (L/p/d) in major municipalities, to between 20-50 L/p/d in the smaller municipalities, which from field experience is simi-

lar to those municipalities without any data.

Table 3 also shows that the technical state of water supply and its distribution networks are rather alarming. The level of deterioration in Gradacac, for example, is as high as 80 per cent. Therefore it is not surprising to see that almost all water distribution networks in the

region experience a leakage level at least 40 to 50 per cent.

Apart from Tuzla and Zivinice, which use sedimentation, filtration and disinfection facilities, the main type of water treatment for other municipalities is only chlorination (disinfection). Furthermore, the treatment facilities only supply water to the town centres in

Table 4: Four major diseases registered at the Cantonal Public Health Institute in four municipalities of the Tuzla Region
(Source: The Cantonal Public Health Institute, 1995)

	Year	Tuzla # Cases	Srebrenik # Cases	Lukavac # Cases	Zivinice # Cases
Bacilli Dysentery	1991	3	-	4	-
	1992	15	-	1	6
	1993	58	1	-	2
	1994	11	-	1	3
Acute Enterocolitis	1991	32	7	9	9
	1992	125	21	10	62
	1993	215	29	16	42
	1994	138	8	6	18
Hepatitis A & B	1991	31	4	16	17
	1992	22	10	2	3
	1993	21	21	4	7
	1994	59	31	23	60
Salmonellosis	1991	43	6	16	15
	1992	29	1	2	4
	1993	1	-	-	-
	1994	5	-	1	-

Table 5: Results of bacteriological survey of water supplied to rural areas, according to type of facilities, in the Municipality of Tuzla (Source: Mehinović, 1998:96)

Type of Water Facility	No. of Samples	No. of Positive Results	Percentage of Positive Results (%)
City waterworks - survey 1	9	1	11
- survey 2	4	2	50
Local waterworks - survey 1	38	25	66
Tapped source - survey 2	45	31	69
Public fountain	14	5	36
Well (above 5 households)	153	129	85
Artesian well	1	1	100
Cisterns	2	2	100
TOTAL:	266	196	74

each municipality. Therefore the real state of treatment facilities for those who do not live in rural areas is much worse, as they are supplied with water directly from local sources, such as garden wells.

Health Consequences of Inadequate Water Supplies in the Tuzla Region

The war in Bosnia and Herzegovina had serious impacts on the health of the population due to the deterioration of environmental and living conditions, malnutrition and destruction of health facilities. Communicable diseases, especially among refugees and IDPs, have shown a large increase throughout the country. For example, the result of a medical survey upon the arrival of 4,200 displaced people from Srebrenica, in the Tuzla Region, showed that 72 % of children had malnutrition, 42% of them suffered from anaemia, 40 % had an upper respiratory tract infection, 31 % had a skin disease, 17 % suffered from diarrhoea, and 17 % had bronchitis (Ministry of Health, 1996).²

The Cantonal Public Health Institute in Tuzla (1995) prepared a report on the health situation in several municipalities in the region. The data provided in this report covers the period from 1991 to 1994, where 1991 and early 1992 figures represent the pre-war situation while mid-late 1993, 1993 and 1994 figures are for war time.³ This data is presented in Table 4, which shows cases registered at the Cantonal Public Health Institute. The figures provided are artificially low for the following reasons: the difficulties of compiling informa-

tion during the war; the Institute received its figures only from the Tuzla General Hospital, while those cases treated in the clinics may not have been sent to them. Therefore it can be assumed that the real state of these four major diseases were in fact much worse in the four municipalities during the period of war. Due to unreliable population estimates, incidence rates of diseases could not be calculated.

The decrease in the number of the given diseases in the Tuzla region for the year 1994 in Table 4 can be explained by the improved response to basic needs by the international community which was effective from early 1994 onwards.

The paper will now present the result of a survey on the bacteriological safety of water in the rural areas of the municipality of Tuzla which are not covered by the Tuzla Town Water Supply. The survey was carried out using the Oxfam's E-coli counting method by the Tuzla Health Centre in 1997. It was particularly important to show the scale of the health problem for approximately 30 per cent of the rural population who are not connected to a town water supply in the Tuzla municipality. Mehinovic (1998: 95) stated:⁴

"The control of quality of water from water supply facilities which are outside of the city waterworks system is performed mostly by no one, except in epidemiologically indicated situations".

From the data in Table 5, 74 % of all facilities tested were positive for bacteriological contamination. Thus the ru-

ral water supply in the municipality of Tuzla posed a high level of danger to public health for possible epidemics of infectious diseases.

Using UNICEF's threshold, which identify water with more than 10 E-coli colonies per 100 ml as polluted, the degree of contamination of water in these positive test results is in excess of acceptable levels. Of the positive test results, 52% had between 1-50 colonies per 100 ml of water, 17% had 51-200 colonies, and 31% had too many colonies to count. Considering the high percentage of E-coli of faecal origin in the water, it is not surprising to see that there was a high incidence of intestinal infectious diseases registered in the municipality of Tuzla during the period when this survey was carried out.

The presence of the above mentioned faecal-oral diseases (water borne and water washed) in the territory of the Tuzla municipality show that water in settlements which are not covered by the town water supply is exposed to a high risk of faecal contamination. Consequently, water in these settlements is not safe for drinking purposes because of bacteriological contamination.

Discussion

The health impacts of inadequate water supplies on the population of the Tuzla Region of Bosnia - Herzegovina have been evaluated in this paper. It highlights a series of challenges in terms of responding to water quantity and quality needs, but also to the existence of an overall bias in the current praxis of water supply improvements for populations in urban areas at the ex-

pense of those living in rural settlements.

Our data clearly show large variations in the number of inhabitants in different municipalities connected to water networks, highlighting the issue of unequal access to adequate and safe water supplies. Those towns in municipalities with more commercial and institutional importance are better served with water supplies than those which are smaller and poorer. It is in fact, ironic that most of those smaller municipalities are now worse off after the war, as they were either divided by the Dayton Line, creating the phenomenon of 'displaced' municipalities, or they were badly affected by the influx of IDPs. The issue of unequal access to adequate and safe water supplies also has a second dimension, as those in town centres of each municipality are more likely to have access to safer water supplies than those living in rural settlements. In other words, the inhabitants who obtain their water from private sources such as private garden and artesian wells or from local waterworks, which are often lacking a treatment facility or consistent testing of water quality, are the most likely to be affected by water-related infectious diseases. Though inequalities between urban and rural areas in accessing adequate and safe water supplies (both inter and intra municipality) has long been a challenge in the context of responding to 'basic needs' in developing countries, this paper shows that the scope of these problems are further exacerbated by the impact of armed conflict.

Furthermore, the framework of planning and implementation of water supplies in war-affected areas is often designated by a series of biases. The field research experience in the Tuzla Region shows that spatial, institutional and political biases have been very decisive in favouring urban groups in water supply construction and reconstruction projects carried out by international NGOs and local authorities during and after the war. It appears that the pre-war era custom of neglecting the needs of rural settlements is often passed over to the post-conflict period, during which those communities living in rural areas become even more marginalised, both politically and economically. As it is said in a Turkish proverb:

"those who are far from the sight will also be far from heart."⁵

the needs of rural settlements become further neglected as towns become the centres for many international relief and development agencies. This concentration of organisations further biases the building of infrastructure and projects towards the towns, consolidating their already well-rooted presence in the political and institutional arena. Therefore, it is crucial that those practitioners involved in the recovery of water supplies in war-affected areas adopt an egalitarian strategy towards rural areas in their approach for water quantity and quality improvements. After all, caring for human life without discrimination, whether it is South or North, far or close, or in urban or rural areas, is one of the basic principles of humanitarianism.

Conclusion

It is evident from the preceding review of displacement and public health issues in the context of the Tuzla region case study that the existence of pre-war bias in the provision of an adequate amount of safe water for populations in urban areas at the expense of those living in rural settlements is often passed over to the post-conflict period. It is often the case that rehabilitation and reconstruction programmes implemented by international humanitarian organisations to improve water supplies in war-affected areas also concentrate on urban areas. As a consequence of this biased approach, the populations in rural areas are the most likely to be affected by water-related infectious diseases. ■

References

- Dangerfield, B. J. (ed.) 1983. *Water Practice Manuals 3 - Water Supply and Sanitation in Developing Countries*, The Institute of Water Engineers and Scientists (London).
- Feachem, R., M. McGarry, and D. Mara 1977. *Water, Wastes and Health in Hot Climates*, John Wiley & Sons (Chichester).
- Jusupovic, F. and Z. Bešlagić. 1998. 'Hygiene and Sanitary Situation in regard to Water Supply and Drinking-Water Safety Control', Institutional Strengthening of Public Utility Enterprises Workshop Report, 21-23 March 1998, Organized by Vodoprivreda BiH (Tuzla, Bosnia and Herzegovina):115-123.
- Kolsky, P. J. 1993. 'Water, Sanitation and Diarrhoea: The Limits of Understanding', *Diarrhoeal Disease: Current Concepts &*

Future Challenges, Transactions of the Royal Society of Tropical Medicine and Hygiene, Volume 87, 3.

- Mears, C. and S. Chowdhury. 1994. *Health Care for Refugees and Displaced People*, *Oxfam Practical Health Guide No. 9*, Oxfam (Oxford).
- Mehinovic, N. 1998. 'Control of Bacteriological Safety of Waters from Water Supply Facilities in the Territory of Tuzla Municipality which are not Covered by the City Water Supply System', Institutional Strengthening of Public Utility Enterprises Workshop Report, 21-23 March 1998, Organized by Vodoprivreda BiH (Tuzla, Bosnia and Herzegovina): 95-101.
- Özderdem, A. 1998. *An Approach to Sustainable Recovery of Urban Water Supplies in War-Affected Areas with specific reference to the Tuzla Region of Bosnia and Herzegovina*, an unpublished DPhil Thesis, PRDU, University of York.
- Özderdem, A. and S. Barakat. 1997. (eds.) *Water under Fire - The Challenge of Post-war Reconstruction of Water Supplies Workshop Report*, PRDU, University of York (UK).
- The Cantonal Public Health Institute. 1995. 'State of the Health in several Municipalities', unpublished report (Tuzla, Bosnia and Herzegovina).
- Thomson, M. C. 1995. *Disease Prevention Through Vector Control: Guidelines for Relief Organisations*, *Oxfam Practical Health Guide No. 10*, Oxfam (Oxford).
- UNHCR, 1997. *UNHCR Repatriation Team Reports*, UNHCR (Bosnia and Herzegovina).
- WEDC, 1991. *The Worth of Water: Technical Briefs on Health, Water & Sanitation with an Introduction by John Pickford*, IT Publications (London).

Notes

1. Fatima Jusupovic (M.D., Msc) and Zijad Bešlagić (Prof., PhD) are working for the Tuzlanski-podrinjski Canton Ministry of Health and the Public Health Institute in Tuzla, respectively.
2. This document was prepared by the Federation of Bosnia and Herzegovina Ministry of Health with assistance of WHO.
3. The war affected the Tuzla Region starting from April/ May 1992.
4. Dr. Nermina Mehinovic works for the Tuzla Health Centre and she led the team who carried out the survey on the bacteriological safety of waters in rural parts of the Municipality of Tuzla.
5. The Turkish proverb mentioned is "Gozden Uzak Olan Gonulden de Uzak Olur". □