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The health sector reforms and the efficiency of public hospitals in Turkey: provincial markets

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Background: Turkey initiated the 'Health Transformation Programme' (HTP) in 2003 to align its health care system with the European Union and OECD countries. This study investigates the impact of these reforms on the efficiency of public hospitals. Our study would contribute to the existing literature with a comprehensive analysis of the health system in a developing country. **Methods:** We employ the data envelopment approach and the Malmquist index to comparatively examine before and after the reform years. Our analyses compare the performances of public hospitals served in provincial markets. Inputs of number of beds, number of primary care physician, and number of specialists, and how they are used to produce outputs of inpatient discharges, outpatient visits and surgical operations are investigated. Indeed, as the performance indicators dead rate, hospital bed occupation rate and average length of stay are considered. **Results:** The HTP was generally successful in boosting productivity due to advancements in technology and technical efficiency but in the socio-economically disadvantaged provinces productivity gains have not been achieved. The average technical efficiency gains took place because of the significantly improved scale efficiencies, as the average pure technical efficiency slightly improved. Lastly, the hospital performance indicators have not improved in the short run. **Conclusion:** It appears that the expected benefits from the health reforms in Turkey have been partially achieved in the short run.

Introduction

Turkey initiated the 'Health Transformation Programme' (HTP) in 2003. As a part of the major structural changes in the health care system, including the integration of security schemes under the Social Security Institution (SSI) and the implementation of Universal Health Insurance, the Ministry of Health (MoH) has implemented important reforms on the hospital sector; within the sector, there were three main public providers: the MoH, the Social Insurance Organization (SSK) and universities. First, in 2004 a performance-based supplementary payment system (P4P) has been initiated in the MoH health facilities. SSK health facilities have been transferred to the MoH. The family medicine has been established for an efficient referral system. The health information systems have been upgraded. Moreover, health personnel in the MoH hospitals accessed to improved medical technology and diagnostics through increased government investments and out sourcing these services to the private sector.[1–3]

The MoH hospitals are financed from two sources: a line-item budget and revolving funds (RFs). RFs revenues comprise >80% of the total hospital budget. The main financer of the RFs is the SSI, private insurance and out of pocket payments constitute less than 1% of the RFs revenues.[4] The line item budget is provided by the Ministry of Finance. Base staff salaries compose the majority part (>80%) of the line-item budget.[3] Before the reforms all budget execution decisions of the MoH hospitals needed to be approved by the MoH. This centralized way of operation restricted the use of RFs for hospital operating costs. With the HTP, the MoH focused on its stewardship role and the P4P provided freedom to the MoH hospitals over the management of RFs.

According to the P4P, up to 40% of the RF revenues can be distributed as supplementary payments to the hospital staff. The P4P is introduced because of health staff shortage and it has targeted to increase the volume of all type of services provided by the MoH hospitals. Thus, a salary of a physician became equal to the base salary plus the P4P bonus payment. Physicians are remunerated bonuses according to points they collect throughout the month from outpatient physical exams, inpatient procedures, tests and diagnoses. An aggregate amount of bonus payments is adjusted by the institutional performance multiplier that is assigned by the MoH according to institutional performance audit results.[1–3,5]

In 2006, in response to rapidly growing MoH expenditures, the SSI agreed with the MOH on a global budget for all MoH hospitals. This global budget was decided depending on the past realizations of the MoH hospitals RFs expenditures. Furthermore, in 2007, to coordinate health payments, SSI has developed the bundled prices for inpatient and outpatient health services that were set upon procedural and ICD 10 coding systems.

The objective of our study is to investigate the impact of the HTP reforms on the efficiency and productivity of public hospitals in Turkey. We employ Data Envelopment Analysis (DEA) and the Malmquist index on the multiple inputs and outputs of the public hospitals in 81 provincial markets in years 2001 and 2006 (pre- and post-reform years, respectively). We search that whether the reforms have an overall effect on productivity (innovation in the Malmquist index) or did they improve locally the productivity by aligning hospitals and combining resources (the merger of MOH and the SSK hospitals may give this result). In the 2009–13 Strategic Plan, the MoH states that the establishment of public hospital unions (PHU) will be completed until 2013[6] and, according to the PHU law, all MoH hospitals in the same province will be united under one union and jointly carry out the planning, budgeting, and implementation. Therefore, to provide the necessary feedback to the policy-makers, we compare the public hospitals in terms of provinces serving as the data management units (DMUs).

In literature, there are three major studies considering the hospital sector efficiency in Turkey employing the DEA: Ersoy *et al.*,[7] Sahin and Ozcan[8] and Sahin *et al.*[9]. None of these studies compare the impacts of the HTP reforms on the efficiency of the public hospitals: Ersoy *et al.*,[7] Sahin and Ozcan[8] evaluate the pre-reform periods; Sahin *et al.*[9] evaluates the after the reform period. Thus, our study contributes literature by assessing the effects of the health sector reforms on public hospitals efficiency by comparing before and after the reform performances.

Methodology

The DEA allows dealing with multiple outputs and inputs while looking for a production ratio that relate outputs and inputs. Due to different

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possible combinations of inputs as well as outputs there may be as many optimums as there are observed optimal combinations. These different optima draw an efficiency frontier against which each DMU's productivity can be evaluated. The analysis can focus on optimizing outputs or inputs, in the analysis the output-driven approach has been chosen as the MoH hospitals managers have limited autonomy to hire or fire staff (the most important input for the hospitals) as all staffing decisions were made by the MoH[5].

The frontier can be derived with two main methods: CCR, based on Charnes, Cooper and Rhoades[10], and BCC, based on Banker, Charnes and Cooper[11]. The main difference between the two is that CCR assumes a constant return to scale (there is an optimal productivity ratio that can be reached whatever is the size of the DMU), while BCC assumes variable return to scales (the optimum is a local one that depends on the size). Under imperfect competition and constraints on finance, DMUs cannot operate at the optimal scale. The variable return to scales (VRS) states the fact that production technology may display increasing, constant, or decreasing returns to scale. In our study, BCC method is employed since, in the Turkish hospital market, there are imperfect competition and financial constraints. The output-oriented VRS DEA model is a very well-known technique (See Färe *et al.*[12] and Seiford and Thrall[13] for the detailed derivation). In this study, DEA program version 2.1 is used to conduct the DEA[14].

According to output oriented DEA, for a given amount of inputs the units producing greater amounts of outputs will be the efficient. In order to illustrate it lets consider figure 1, in which there are four DMUs (A, B, C and D) as each unit uses the same amount of a single resource but produces different amounts of outputs, y1 and y2. Employing the DEA to these units will classify A, B and C as efficient and they altogether construct the envelopment frontier and have an efficiency score of one. As D lies below this frontier, it is inefficient compared to its peers B and C. For unit D, the target is D' because D can achieve it by increasing its outputs without requiring any extra inputs. Hence the distance DD' measures the inefficiency, as the ratio 0D/0D' measures the output oriented technical efficiency. The inefficient DMUs has a technical efficiency score between one and zero[10,13–15].

The DEA allows to look at different factors for productivity change[12,16] between different periods. First, a technical productivity change that checks for the optimization of each DMU combination of inputs according to the benchmark for that combination, this is a local comparison to the best DMUs working with similar size. Secondly, a technical change productivity that looks for improvement by global innovation that shifts the frontier and the optimal size.

These two factors can be measured by the Malmquist productivity change index that is defined as follows:[12,16]

$$M_0(y_{t+1},x_{t+1},y_t,x_t) = \{[D_0^t(x_{t+1},y_{t+1})/D_0^t(x_t,y_t)] \times [D_0^{t+1}(x_{t+1},y_{t+1})/D_0^{t+1}(x_t,y_t)]\}^{1/2}$$

here $x_t \in \Re_+^N$ and $y_t \in \Re_+^M$ denote, respectively, an input vector and an output vector in period t, $t = 1,\ldots,T$. This equation states the productivity of the production point (x_{t+1}, y_{t+1}) with respect to the production point (x_t, y_t). This index is the geometric mean of two output-based Malmquist TFP indices, such that one index applies period t technology and the other period $t+1$ technology. If the Malmquist productivity change index is greater than 1, the improvement in productivity is gained relative to the previous year. However, if the index is less than 1 the productivity deteriorates, and if the index is equal to 1 then no productivity change occurred.

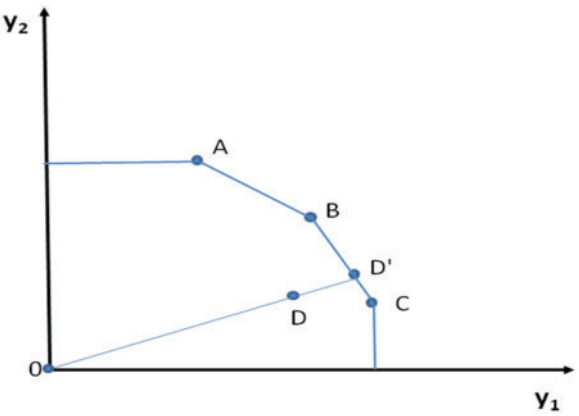


Figure 1 Illustration of output oriented DEA

The productivity of DMU rises if it uses its existing inputs more efficiently, and so it can produce more while consuming the same levels of inputs. In other words, productivity grows as technical efficiency grows. Also, the productivity can rise because of technological change such as adopting innovations like advanced IT technologies, improved designs and products. Thus, Malmquist index of productivity change (TFPCH) can be decomposed into technical efficiency change (EFFCH) and technological change (TECHCH), as follows: TFPCH = EFFCH × TECHCH.

Following Färe *et al.*,[12] we also employ an improved decomposition of the Malmquist index. This improved decomposition considers the TECHCH component calculated under the constant returns to scale (CRS) technology and separates it into a pure efficiency-change component (PEFFCH, that is derived under the VRS technologies) and a scale-change component (SCH, which shows changes in the deviation between the VRS and CRS technology). Consequently, the decomposition of Malmquist index becomes: TFPCH = (PEFFCH × SCH) × TECHCH.

Furthermore, we employ a non-parametric Wilcoxon signed-ranks test, which does not require any assumptions on the distribution, to compare before and after the reform performances of the MoH hospitals.[17]

Data

In 2001, there were 751 hospitals run by the MoH, 118 by SSK, 43 by universities, and 267 by private sector.[18] In 2004, the MoH and SSK signed protocol for common use of their health facilities, and in 2005, all SSK hospitals had been transferred to the MoH. In 2006, there were 769 hospitals operated by the MoH, 56 university and 332 private hospitals.[19] Before the reforms MoH, SSK, university and private hospitals had been serving for 53.3%, 35.1%, 7.1% and 3.6%, respectively, of all outpatient visits and 51%, 24.8%, 14.2% and 9.6% of the annual number of hospitalized cases.[19] After the reforms MoH, university and private hospitals have been serving for 87.1%, 5.8%, 7.0%, respectively, of all outpatient visits and 70%, 15.01% and 15.7% of the annual number of hospitalized cases.[19]

During 2005 and 2006, most of the transferred SSK hospitals were merged with the MoH hospitals. As we could not eliminate the SSK hospitals from 2006 data since they were already transferred to the MoH management, for 2001 we have also included the SSK hospitals' input and output data into our analysis.

The university hospitals are operated according to totally different operational systems and regulations. Hence, main public health care providers, except university hospitals, in 81 provinces in Turkey that responded to the annually published *MoH Statistical Year Book of Inpatient Health Care Organizations of Turkey*, 2001 and 2006, were included in this analysis.[18,19] The descriptions of employed input and output variables are presented in Table 1.

Hospitals do not serve the patients that are in identical conditions; there are always differences in terms of patient's characteristics, complications, and severity of illness. Thus, previous studies have introduced case mix indices or such a correction is neglected at all.[20–24] We used the case-mix index proposed by Roemer *et al.*[21] to adjust hospital inpatient cases. Roemer case-mix index multiplies average length of stay (ALS) of a DMU by its occupancy rate and divides this by the average occupancy of all the samples. Here, ALS depends on case-mix complexity as well as other factors such as bed availability and age. According to the Roemer formula, ALS will be adjusted upwards if the DMU's occupancy rate is above the average level, because that DMU is inclined to hospitalize its patients longer if they do not have a space availability problem. Finally, to compute case-mix adjusted inpatient cases, the annual number of

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Table 1 Description of the variables of interest

Variables	Description
Output variables	
Outpatient visits	The number of outpatient visits within a year.
Inpatient cases case-mix adjusted	The annual number of hospitalized cases (including both discharges and deaths) adjusted for case-mix by Roemer index.
Total number of surgery	The total number of surgeries within a year.
Input variables	
Beds	The number of existing patient beds within the hospital ready for use.
Specialists	The total number of specialist medical doctors employed in the public hospitals in the province.
General practitioners	The total number of general practitioners employed in the public hospitals in the province.
Hospital quality indicators	
Hospital mortality rate	Hospital mortality rate is the ratio of the number of inpatients die during hospitalization to the number of inpatients.
Bed occupation rate	It refers to the percentage of beds that are occupied by inpatients at any given time (= total patient days*100/existing patient beds*duration) duration is taken as 365.[a]
Average length of stay	It is the average amount of time spent in hospital which is defined as the mean number of days that an inpatient stays in hospital from the time of admission to discharge [=Total patient days/(total number of patients discharged or death)].[a]

[a]Definitions are taken from the *MoH Statistical Year Book of Inpatient Health Care Organizations*, 2006.

Table 2 Descriptive statistics of output and input variables in 2001 and 2006 ($n = 81$)

Variables	2006			2001			
	Mean (SD)	Min.	Max.	Mean (SD)	Min.	Max.	W-test
Output variables							
Outpatient visits	2 338 545 (3 024 247)	116 493	21 935 848	1 317 115 (1 879 192)	98 865	14 809 609	−7.79(a)
Inpatient cases (discharges + death)	65 473 (83 657)	3092	553 519	50 231 (62 026)	3588	420 309	−7.55(a)
Inpatient cases (Case-mix adjusted)	80 243 (138 244)	797	1 003 171	66 995 (133 564)	855	1 039 415	−6.10(a)
Total number of surgery	35 752 (67 386)	1259	385 164	16 105 (30 254)	457	183 162	−7.70(a)
Hospital mortality rate	0.012 (0.026)	0.000	0.240	0.010 (0.005)	0.001	0.029	−0.57
Bed occupation rate (%)	55.9 (12.0)	14.8	82.3	55.2 (12.98)	20.6	86.8	−1.01
Average length of stay	4.75 (1.02)	2.57	8.47	4.8 (1.14)	1.8	9.2	−1.24
Roemer index	4.83 (1.73)	1.24	10.67	4.92 (1.98)	1.17	12.18	
Input variables							
Beds	1473 (2006.5)	110	15 038	1249 (1874)	100	14 661	−7.14(a)
Specialists	294 (594)	24	4126	233 (492)	2	3648	−7.80(a)
General practitioners	189 (585)	5	4244	148 (421)	6	2956	−4.98(a)

Source: Our own findings using the data obtained from the Statistical Year Book of Inpatient Health Care Organizations of Turkey, 2001 and 2006.
Notes: W-test: Wilcoxon test. The statistical tests are computed against the reference group which is taken as the 2006 variables. (a) and (b) denote the statistical difference respectively at 1% and 5% significance levels.

hospitalized cases in each DMU has been multiplied by the Roemer case-mix index and divided by the respective mean in the sample.[23,24]

Furthermore, we compare and statistically analyze the pre and post reform realizations of the performance indicators (the hospital mortality rate, the occupation rate and ALS) by employing Wilcoxon signed-rank test.

Empirical results

Descriptive statistics for the public hospitals in terms of provinces serving as DMUs in this study are presented in Table 2. First, we see that all output and input variables have increased between 2001 and 2006: the mean of the outpatient visits, inpatient cases, case-mix adjusted inpatient cases and surgeries rose around 78%, 30.3%, 20% and 122%, respectively; and the total number of beds, specialists, and general practitioners rose around 18%, 26% and 27.7%, respectively. However, the bed occupation rate almost stayed same (∼55%).

Between 2001 and 2006, the Malmquist productivity change index and its detailed decomposition into technical and technological productivity changes and scale effects are obtained from the output oriented Malmquist DEA model. Instead of presenting the disaggregated results for each province, we exhibit the average performances in Table 3 (disaggregated results for each province are available upon request). Our results show that, on average, the MoH hospitals in terms of provinces experienced total factor productivity (TFP) growth since

Table 3 Malmquist productivity change index summary for provincial markets ($n = 81$)

	Overall mean for all ($n = 81$) provincial markets	Min.	Max.
TFPCH	1.32	0.37	2.50
TECHCH	1.21	0.53	1.77
EFFCH	1.09	0.29	1.87
PEFFCH	1.01	0.37	1.79
SCH	1.08	0.65	1.52
	Number of provincial markets that Malquimst indexes are:		
	>1 (improvement)	=1 (no change)	<1 (decrease)
TFPCH	74	0	7
TECHCH	76	0	5
EFFCH	50	6	25
PEFFCH	32	19	30
SCH	53	6	22

Source: Our own findings.
Note: All Malmquist index averages are geometric means. TFPCH: Malmquist index of productivity change, TECHCH: Technological change, EFFCH: Technical efficiency change, PEFFCH: Pure efficiency-change, SCH: Scale-change.

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TFPCH = 1.32. The TFP has improved in 74 provincial markets and decreased only in seven provincial markets that are all among the socio-economically least developed provinces, (except two of them). Furthermore, the results indicate that the average changes are positive in both technological progress and technical efficiency, with growth indices of TECHCH = 1.21 and EFFCH = 1.09, respectively. Thus, the overall TFP growth has occurred because of both the innovation and the improved efficiency.

Next, we examined the efficiency gain (TECHCH) in detail by decomposing it into pure technical efficiency (PEFFCH) and scale efficiency (SCH) components. When we consider the mean pure technical efficiency only 1% increase is observed between 2001 and 2006 as PEFFCH = 1.01, whereas the mean scale efficiency has risen to 8% as SCH = 1.08. Thus we conclude that the efficiency gain after the reforms has occurred because of improved pure technical efficiency and scale efficiency but the scale efficiency enhancement was the engine of it. The average scale efficiency improvement after the reform could have been attributed to a considerable increase in the mean bed size. According to our analysis, 53 provincial markets have increased their scale efficiency, 22 have reduced it, and 6 were efficient in both periods. Under VRS technology: 32 provincial markets have increased their pure technical efficiency, 30 have reduced it and 19 were efficient in both periods.

We further investigated the efficiency and productivity of the hospitals served in socio-economically least developed provinces. According to the State Planning Organization categorization, there are 17 provinces that constitute the least developed group.[25] The DEA Malmquist index results indicate that no change occurred after the reforms in the productivity of the public hospitals that served in the least developed provinces (average TFP change index was equal to 1). Also, it is found that the average technical efficiency deteriorated as the average of indices was 0.94. However, the technological progress has upgraded, as the average index growth was 1.06.

Discussion

This study investigates the impact of the HTP reforms on the efficiency of the MoH hospitals by employing DEA and the Malmquist index on the multiple inputs and outputs of the MoH hospitals in 81 provincial markets in years 2001 and 2006. First of all, according to the output oriented DEA-Malmquist index results the total factor productivity of MoH hospitals in terms of provinces improved because of enhanced technological and technical efficiencies. Thus, we conclude that the HTP reforms were successful in boosting the health staff productivity, providing widespread use of the latest technologies and providing an increased volume of health care services.

We further analysed the sources of efficiency gain by separating it into pure technical and scale efficiency components. We see that both components have improved during the 2001–2006 period. However, the average increase of pure technical efficiencies was very low compared to that of scale efficiencies. The significant improvement of the scale efficiencies suggests that the restructuring of public hospitals (with mergers between the SSK and MoH) have crucial role in the observed efficiency gains.

Additionally, our analyses indicates that in the socio-economically most disadvantaged provinces, productivity gains have not been achieved because of the deterioration in the technical efficiency, even though there was an improvement in the technological progress. In Turkey, the main problem of the less developed regions is the health personnel scarcity. After the HTP reforms the 'inverse care law' (access to care inversely related to need for care) exists as significant differences in the number of health staff remain between the least developed regions and other regions.[1–3,26]

Moreover, since the P4P system was rewarding the production of health services, the increase in the volume of the output was expected. But, our analysis of productivity indicates that the health staff has much more control over the quantitative production of the hospitals than previously thought. Since 2006, the health insurance payments made by SSI to the MoH hospitals were capped. However, it cannot prevent the health personnel from producing a high volume of healthcare services and consuming resources unnecessarily as their supplementary payments directly depend on the number of services they produce.

Furthermore, we found that the considered performance indicators have not improved in the short run. The bed occupation rate almost stayed the same. One reason for low occupancy rates in MoH hospitals could be the inadequate pricing system in which complex inpatient care is underpaid. As it has been emphasized by Özmen[27] tertiary care providers complain about the pricing of the complex procedures that did not capture the clinical conditions and the resource consumptions. Özmen[27] states that, hospitals prefer to choose less ill patients to financially survive and compensate their losses occurred because of providing complex clinical services.

Consequently, our analysis finds that the expected benefits from the health reforms in Turkey have been achieved partially in the short run.

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Key points

- In 2003, Turkey initiated the reforms to align its health care system with the European Union. We investigate the impact of health reforms on the efficiency and productivity of public hospitals in Turkey.
- We employ Data Envelopment Analysis and the Malmquist index on the multiple inputs and outputs of the public hospitals in 81 provincial markets in the pre- and post-reform years.
- Our analysis finds out that there was a rapid raise from a stagnant and inefficient system into an active system in the short run. The increase in the volume of the output was expected, but we see that the health staff has much more control over the quantitative production of the hospitals than previously thought.
- It is apparent that the development of clinical guidelines and clinical performance indicators and the establishment of the Diagnostic Related Groups system are necessary to promote cost containment and improve the quality health care.
- Our analyses indicate that in the socio-economically most disadvantaged provinces, productivity gains have not been achieved.
- Lastly, the hospital performance indicators have not improved in the short run.

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Use of healthcare services 8 years after the war in Kosovo: role of post-traumatic stress disorder and depression

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Background: The aim of the present study was to examine the use of health-care services and medication, as well as health risk behaviours such as smoking, in relation with post-traumatic stress disorder (PTSD) and major depressive episode (MDE) in post-war Kosovo. **Methods:** A sample of 864 adults was interviewed in 2007 of which 551 took part in a 2001 survey. They were assessed using the PTSD and MDE sections of the Mini International Neuropsychiatric Interview (MINI) and the Medical Outcomes Study 36-item Short Form Health Survey (SF-36). Use of health-care services, alcohol and tobacco were also recorded. **Results:** Respondents were predominantly female (56.6%) with a median age of 36 years and a primary educational level (44.6%). While 11.9% of participants met diagnostic criteria for PTSD, MDE prevalence was 30.6%. Both PTSD and MDE were significantly associated with lower scores on the SF-36 physical component summary. After adjustment for sex, age, education, unemployment, municipality and SF-36 perceived physical health, no significant association was observed between PTSD and medical visits in the past 12 months, hospitalizations in the past 12 months and use of medication in the past 7 days. Results were similar for MDE, except for a significantly higher frequency of medication use that included psychotropic and other drug classes. **Conclusion:** Eight years after the war in Kosovo, poor perceived physical health displayed a long-lasting association with PTSD and MDE and was a major determinant of increased use of health-care services without additional contribution of PTSD *per se*.

Introduction

Consequences of collective trauma on the mental health of civilian populations have been studied in various settings. A systematic review and meta-analysis of the prevalence rates of post-traumatic stress disorder (PTSD) and depression in the refugee and post-conflict mental health field included 161 articles.[1] Noteworthy, only a third addressed long-term outcome (6 years or more after the conflict) and, among these, most were conducted in countries of asylum rather than in post-war countries. The scarcity of long-term follow-up studies probably reflects the time-frame of humanitarian and crisis intervention programmes, which are too often designed on a short-term basis.

PTSD, which can be understood as the inability to recover from a stress reaction to a traumatic event, is often long-lasting in civilian adult survivors of war[2] and can display a delayed onset.[3] Research conducted with Holocaust and World War II survivors[4] suggested that suffering

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