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TECHNICAL
MEMORANDUM
ORO-T-71
(AFFE)



US Army Battle Casualties in Korea (U)

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WORKING PAPER

This is a working paper presenting the considered results of ORO Study 62.2 (b) by members of the technical staff of the AFPE Group.

The objective of the study is to determine the distribution of causative agents among battle casualties as a function of type of operation and weapon structure to provide an indication of casualty distributions in future actions, to include atomic weapons. This paper, ORO-T-71(AFPE), deals with all aspects of the study. The findings and analysis of this paper are subject to revision as may be required by new facts or by modification of basic assumptions. Comments and criticism of the contents are invited. Remarks should be addressed to:

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AFFE GROUP

Technical Memorandum ORO-T-71 (AFFE)

Published October 1956

US Army Battle Casualties in Korea (U)

by

Frederick W. Cleaver



OPERATIONS RESEARCH OFFICE
The Johns Hopkins University Chevy Chase, Maryland

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FOREWORD

This study was originally undertaken to provide background information on the patterns of casualty causation in conventional warfare as part of ORO's study of Atomic Warfare in the Far East. It is felt, however, that the results obtained were of sufficient general interest to justify its separate publication. Presented in this study are quantitative information on casualty rates, causative-agent distributions, and lethalties associated with the various types of operations conducted in the Korean war. Certain of the conclusions may be qualitatively obvious; however, the value of the study lies in the fact that actual magnitudes are developed.

The author wishes to acknowledge his indebtedness to Mr. Eugene A. Soto, ORO, who assisted in the collection and tabulation of the sample data used in this report; to Maj John C. Finnerty, Chief, Miscellaneous Projects Branch, Adjutant General's Office, AFPE, who tabulated the casualty records for the period September 1952 through August 1953; and to other members of the ORO AFPE 8/A (R) staff who contributed many worth-while suggestions throughout the course of the work.

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SUMMARY

PROBLEM

To aggregate from battle casualty experience in the Korean war quantitative information on the casualty rates, causative-agent distributions, and agent lethality (as measured by the proportion of deaths among total casualties) associated with the various types of operations conducted in that war.

FACTS

The Korean war can be divided arbitrarily into intervals in which the predominant types of operations of Eighth Army as a whole were one of the following:

- (a) Offensive against the main enemy force
- (b) Offensive against an organized delaying force
- (c) Offensive against a partly disorganized delaying force
- (d) Offensive against fortified hill positions
- (e) Defensive against the main enemy force
- (f) Defensive with main pressure on non-US units
- (g) Withdrawal
- (h) Position warfare

From casualty records maintained by the Offices of the Adjutant General (AG) and the Surgeon General (SG), estimates of casualty rates, causative-agent distributions, and status distributions (killed, wounded, and missing) for each type of operation have been obtained. From data on casualties sustained after August 1952, proportions of death among total casualties for each agent have been computed.

These experience factors should prove useful in the prediction of probable casualty patterns in a future conventional war, in the analysis of conventional weapons systems, and as a point of departure for studies of atomic warfare in the Far East.

DISCUSSION

The casualty rates and status distributions applicable to each type of operation were estimated from the monthly casualty totals published by the AG. The values obtained are averages for all divisions in the combat area during the intervals in which the particular type of operation predominated regardless of

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whether they were in continuous combat, and are comparable to the long-term casualty estimate in FM 101-10,¹ except that, whereas this value represents average WWII experience in Europe for all types of operations, the values computed here show the extent to which values for individual operations differed.

Casualties per division per day averaged 119, 77, and 67 in withdrawal, defense against main enemy force, and offense against main enemy force, respectively. For other types of operations, the casualty rates ranged from 6 to 35 per division per day. The WWII average for all types of operations as shown in FM 101-10 was 60.

KIAs comprised 25.2 percent of casualties in defense against the main enemy force and 14.6 percent in offense against the main enemy force as compared with a WWII average of 17.2 percent. In withdrawal, KIAs comprised 15.2 percent of total casualties; however, 40.2 percent of these casualties were listed as MIAs. In other types of operations the percentage of KIAs ranged from 16.1 percent to 18.8 percent. Except in withdrawal operations, the proportions of MIAs were less than or equal to, and those of WIAs greater than or equal to the FM 101-10 estimates of 13.0 and 69.8 percent, respectively, in each type of operation.

The distributions of battle casualties among causative agents for each type of operation were estimated from a 10 percent sample of individual AG casualty records for the period July 1950 through August 1952. Because of the small number of noninfantry casualties in the sample for each type of operation, the causative-agent distributions were studied in detail only for infantry casualties. It should be noted that AG casualty records were maintained on only those casualties whose wounds resulted in more than a day's absence from their units.

The proportion of casualties caused by small arms ranged from 23.6 percent in offense against fortified hill positions to 58.4 percent in offense against partly disorganized delaying forces; whereas the proportions of artillery- and mortar-caused casualties ranged from 25.2 percent in the latter type of operation to 64.9 percent in the former. In general it was apparent that the proportions of small-arms casualties were highest in those operations in which movement of the MLR was rapid, while artillery and mortar casualties were highest in those operations in which movement of the MLR was relatively slow.

The proportions of hand-grenade-caused casualties varied from 9.5 percent to 2.4 percent and those of mine and booby traps from 7.8 percent to 0.3 percent. In each case the higher proportion occurred in positional warfare while the lower was experienced in withdrawals. In this latter type of operations, however, the proportion of casualties for whom the causative agent was unknown was 26.6 percent.

The percentages of deaths among total casualties for each agent were determined from a tabulation of data on all casualties recorded by the AG for the period September 1952 through July 1953. Since these casualty records provided information on the specific type of activity in which the casualty was im-

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SUMMARY

mediately engaged, it was possible to study variations in these percentages for each agent with changes in the type of activity. The average death percentages of the causative agents were as follows:

Agent	Percent
Small arms	28.4
Mines and booby traps	23.8
Artillery and mortars	18.4
Hand grenades	10.8

It was observed, however, that the death percentages for particular agents varied with type of immediate activity. Death percentages for small arms and artillery and mortars were both highest in defensive activity (38.4 and 25.9 percent, respectively). The small-arms death proportion was lowest in offensive activity (15.0 percent) and that of artillery and mortars was lowest in rear-area duty (15.2 percent).

CONCLUSIONS

1. Casualty rates in withdrawals, defense against the main enemy force, and offense against the main enemy force differed from the WWII average given in FM 101-10¹ by factors of 2, 1.3, and 1.1 respectively.

2. The proportion of KIAs among total casualties in defense against the main enemy force exceeded the proportion in offense against the main enemy force by a factor of 1.7.

3. The proportions of casualties caused by small arms in different types of operations varied from 23.6 to 58.4 percent. Higher proportions occurred in those operations in which movement of the MLR was rapid. The proportions caused by artillery and mortars ranged from 25.2 to 64.9 percent; higher values occurred in those operations in which movement of the MLR was slow.

4. The order in which agents ranked on the basis of the percentage of deaths among total casualties was (a) small arms (28.4 percent), (b) mines and booby traps (23.8 percent), (c) artillery and mortars (18.4 percent), and (d) hand grenades (10.8 percent). These percentages varied with the types of activity in which the casualties were immediately engaged.

RECOMMENDATION

1. The values derived here constitute useful supplements to the planning data for staff officers in FM 101-10¹ and should be included in revisions of that manual.

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US ARMY BATTLE CASUALTIES IN KOREA

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INTRODUCTION

OBJECTIVE

The objective of this paper is the development of quantitative information on the casualty rates, causative-agent distributions, and agent lethalties (as measured by the proportions of deaths among total casualties) for the various types of operations that comprised the Korean war. Battle casualty rates were studied from the standpoints of both total strength losses and utilization of medical facilities. Causative-agent distributions and lethalties were studied in relation to both the general and specific types of activities in which the individuals were engaged at the time the casualties occurred.

TYPES OF OPERATIONS

The values for each of these characteristics were affected by differences in the general tactical situation. For this reason, data were studied separately for each of the various types of operations that occurred in the war. The Korean war can be arbitrarily divided into intervals in which the predominant types of operations of Eighth Army as a whole were one of the following:

- (a) Offensive against the main enemy force
- (b) Offensive against an organized delaying force
- (c) Offensive against a partly disorganized delaying force
- (d) Offensive against fortified hill positions
- (e) Defensive against the main enemy force
- (f) Defensive with main pressure on non-US units
- (g) Withdrawal
- (h) Positional warfare

These categories and the intervals included in them are discussed in more detail in App A. Unfortunately, data on neither the day-to-day operations of smaller units nor daily casualties on a unit basis were available to this study, so that it was not generally possible to develop data on types of operations for levels lower than Army.

DATA SOURCES AND CHARACTERISTICS

Agencies Concerned with Casualty Records

The two agencies of the Army primarily concerned with the maintenance of casualty records are the Offices of the Adjutant General (AG) and of the Surgeon General (SG). Since these two agencies are concerned with different

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facets of the casualty problem the records maintained by each differ in some respects. The SG records include only those casualties who came to the attention of medical facilities and, of course, omit MIAs unless they were treated for wounds subsequent to their return to military control. The SG records include also those superficially wounded personnel who returned to their units after brief (or first-aid) treatment. Since the AG was primarily concerned with strength accounting, only those wounded who required hospitalization were recorded by this source. AG casualties include personnel carried in MIA status by their units; however, many such individuals may actually have been KIAs or WIAs, and may be included in the SG records as such.

While discrepancies between AG and SG data make it impossible to determine casualty rates and distributions that would be applicable to all battle casualties however slight, they do provide a basis for separate analysis of casualty patterns in the areas of strength reduction and medical treatment. In this study, primary interest is in those battle casualties who became strength losses.

AG Casualty Records

US Army battle casualties for each month of the Korean war and their distribution among killed, wounded, and missing were published in the various issues of Far East Command (FEC) "Personnel Statistics."² These data were based on tabulations from information released by the AG's Casualty Division. An estimate of casualties for each of the time intervals (which did not generally begin or end on the first days of the months) were interpolated, based on total SG casualties for the interval. (See App B.)

Data on the causative agents of battle casualties for the period 1 Jul 50 through 31 Aug 52 were obtained from a sample of individual casualty records maintained by the AG (AFFE). These records included a casualty report form submitted by the AG of the division to which the casualty belonged. This form provided space for information on the causative agent and a description of the circumstances under which the casualty occurred. This information was in turn based on a feeder form submitted by the CO of the casualty's company. Although the reliability of such sources cannot be established, the reports were frequently accompanied by substantiating reports of the medical facility at which treatment was received.

Records of 8857 battle casualties were examined in the AG sample. For each casualty, the date, causative agent, branch of service, and the specific type of activity in which the individual was engaged at the time the casualty occurred were recorded.* To facilitate tabulation of data, categories of causative agents and activities were established as follows:

Causative Agents. Small arms, artillery and mortars, hand grenades, mines and booby traps, and unknown.

Activity. Active offense, active defense, maintenance of position (against minor raids or patrols or in the absence of troop contact, but excluding defense

* The term "type of activity" as used here should not be confused with the term "type of operation." The latter refers to the operations of the Army as a whole whereas the former refers to the activity of the individual at the time he became a casualty. The operation of the Army may have been defensive in nature at a particular time; however, many casualties during that time may have been engaged in an offensive or other activity.

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against attacks aimed at seizing and holding ground), patrol activity, duty in rear combat area (such as battalion or higher headquarters, reserve areas, etc.), and unknown.

Although the desirability of more detailed information was recognized, particularly on causative agents, these categories were in keeping with the level of preciseness in the reports.

Certain types of casualties included in the total AG casualty data were not included in the sample. All MIAs who did not return to military control or who were not confirmed in some other status prior to 31 Aug 52 were not included in the population from which the sample was drawn. MIAs who returned to military control without having sustained a wound were not included. Transportation and environmental injuries that were not the direct result of enemy weapons, and casualties to friendly weapons (except mines whose origin was not specified) were also excluded. As mentioned above, data on superficially wounded casualties were not available in AG records.

The numbers of noninfantry-branch casualties in the sample proved insufficient for detailed analysis; hence, causative-agent data on infantry casualties only are presented.

For battle casualties sustained after August 1952, information similar to that discussed above had been placed on IBM cards by the Statistical and Accounting Branch, AG (AFFE). At the request of ORO (AFFE) a tabulation of these cards was made. The volume of this data, 14,812 casualties, permits detailed analysis of the percentages of deaths among total casualties for the various types of agents for casualties sustained in the different types of activity as well as of causative-agent distributions for that part of the war.

SG Casualty Records

For each US Army battle casualty who came to the attention of medical facilities, the Office of the Surgeon General, DA, maintained an IBM card on which were recorded, among other items, the date of casualty, causative agent, branch of service, and status (killed, wounded, etc.). A tabulation of this data was made by the Computing Laboratory, ORO, (Washington), for each time interval associated with the various types of operations.

The data on causative agents suffer from one major deficiency: the causative agents for the majority of the KIAs were not specified. The only useful data on agents from this source concerned WIAs. For this reason it is impossible to develop estimates of lethality of the various agents from medical data.

The categories of causative agents used by the SG differed slightly from those used elsewhere in this study. Hand-grenade and mine and booby-trap casualties are aggregated into one group. Environmental and transportation injuries and casualties to friendly weapons are listed separately. In this study these casualties are aggregated into a single category, "other agents."*

It has been mentioned above that the principal difference between AG and SG casualty records is the inclusion in the latter of superficially wounded individuals. A rough estimate of the magnitude of this type of casualty may be

*Also included in this group is the agent category "atomic, biological, and chemical warfare" in which a few casualties were listed, presumably in accidents involving smoke-generating units.

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obtained by comparing the numbers of WIAs from both sources of the various types of operations.

From such a comparison it was seen that the proportion of total SG recorded casualties that were in this category varied for different types of operations. While in offensives against the main enemy force and partly disorganized delaying forces total SG WIAs were less than those in AG data, in other types of operations the superficially wounded consisted of from 5 percent for withdrawal, to 30 percent for positional warfare. The over-all average was 9.7 percent. In general, it can be said that the proportion was higher in those types of operations in which pressure on US units was relatively low or during which the rate of movement of the MLR was small. This may have been caused by failure to maintain detailed records on the superficially wounded during periods of heavy pressure, and/or by a reluctance on the part of these wounded to leave their units for treatment at such times. Other special features of these data are discussed in detail in App C.

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CASUALTY RATES AND STATUS DISTRIBUTIONS

In this section, casualty rate estimates for various types of operations mentioned in the "Introduction" are presented. These estimates were interpolated from AG monthly casualty totals on the basis of total battle casualties who received medical attention in each interval (see App A). Although the results are not so precise as those that might be yielded by a complete tabulation of casualty records for the intervals involved, they show with sufficient accuracy the extent to which casualty rates and status distributions varied with changes in types of operations.

The values are average casualty rates for all divisions in the combat area for the time intervals for which the operations of Eighth Army as a whole were of the type specified. It should be noted that all these divisions did not participate in sustained operations of the types mentioned over all days of the time intervals. Thus the data shown are valid as long-term estimates only; day-to-day values will fluctuate depending on the intensity of combat. For each time interval, of course, the rates for the various divisions also fluctuated with the extent to which their participation in actions was sustained.

In FM 101-10 an estimate of average casualties for a division in the combat area based on WWII experience is given as 10 percent per month or 60 casualties per day.¹ The same source also gives the status distribution of these casualties as:

Category	Percent
Killed	17.2
Wounded	69.8
Missing	13.0

These estimates are expected averages over all types of operations. The extent to which these percentages differ from those in Table 1 is of interest.

It is seen that the casualty rates in Korea were substantially in excess of the estimated average in withdrawals, 98.2 percent; and that in offensives and defensives against the main enemy force they exceeded the estimate by 11.7 and 28.3 percent, respectively. It is in these operations that the participation of all divisions was continuous. In other types of operations casualty rates ranged from 58.2 percent down to 10 percent of the FM 101-10 estimate.¹

In defensive actions against the main enemy force, the proportion of KIAs was 46.5 percent above the FM 101-10 estimate; in offensive action against the

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main enemy force this proportion was 20.9 percent below that estimate. In other types of operations the variation of this proportion from the estimate is less than 10 percent, except in the case of withdrawals for which the proportion is 11.6 percent below the estimate. In the latter type of operation, however, the proportion of MIAs is quite large; the proportion of KIAs among nonmissing casualties is 28.8 percent higher than the comparable proportion in the FM 101-10 estimate.¹

Except in the case of withdrawal operations, the proportion of WIAs was larger than or equal to the FM 101-10 estimate, and the proportion of MIAs was less than or equal to the estimated value. MIAs were 3.09 times the estimate in withdrawal, whereas wounded were 36.4 percent below the estimate.

Table 1
CASUALTY RATES AND STATUS DISTRIBUTIONS FOR
DIFFERENT TYPES OF OPERATIONS
(AG data)

Type of operation	Casualties per division per day	Status distribution, percent		
		Killed	Wounded	Missing
Offensive				
Against main enemy force	67	14.6	83.2	2.3
Against delaying force				
Organized	26	18.2	69.6	12.2
Partly disorganized	12	18.8	75.9	5.3
Against fortified hill positions	34	17.5	79.4	3.1
Defensive				
Against main enemy force	77	25.2	68.8	6.2
Main pressure on non-US units	35	16.1	70.6	13.2
Withdrawal	119	15.2	44.5	40.2
Positional warfare	6	18.6	75.0	6.4

From the tabulation of casualty records of the Office of the Surgeon General, DA, the rates at which battle casualties were handled by medical facilities, the distributions of these casualties among the branches of service and among causative agents, and the proportions of KIAs among these casualties for individual branches and for all branches together were determined for each time interval and hence for each type of operation. This information is presented in detail in App C and is summarized below.

The battle casualty handling rate in terms of casualties per division per day is shown in Table 2, together with the death percentages and the distribution of casualties among the combat branches separately, and service branches together, for each type of operation.

The differences between SG and AG data appear to have been compensating so that casualty rates for these sources are not substantially different except in the case of withdrawal operations. In this case, since the number of AG-recorded casualties in the KIA or WIA status is quite close to the total SG casualties, it may reasonably be assumed that the difference in this case consists of MIAs.

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The average death percentage for the war as a whole from SG data was 17.2 percent; however, if the static period is eliminated this proportion was 18.8 percent. The comparable estimate in FM 101-10¹ is 20 percent. The proportions recorded were highest in withdrawal operations and in both offensive and defensive operations against the main enemy force; however, this may have been caused in part by a failure to maintain detailed records on the superficially wounded under the pressure of such operations, as has been mentioned previously.

The distribution of casualties among branches of service estimated in FM 101-10 was:

Branch	Percent
Infantry	81.9
Artillery	4.5
Armor	6.6
Service branch	7.0

The average values for SG data in the Korean war differed primarily in that an increase to 5.7 percent in artillery casualties and a decrease to 5.3 percent in armor casualties occurred. Infantry casualties averaged 81.1 percent of the total, and service branch losses were 7.9 percent.

SG death percentages for the casualties of the various branches were quite different. These values are shown in App C for each type of operation. Infantry casualties had generally the highest death rates, followed by artillery, service branches, and armor in that order. Table 3 shows the SG average KIA proportions for (a) the war as a whole, and (b) the nonstatic part of the war. No complete explanation can be advanced for the apparently low percentages of deaths among total armor casualties. It is possible that KIAs sustained in mobile operations did not receive the attention of medical facilities or that large numbers of minor injuries, the secondary effects of causative agents, were included in the SG data.

The SG casualty records include the specification of the causative agent, although, unfortunately, in the case of the majority of KIAs, the agent was listed as unknown. For this reason the lethalties of the various agents, as measured by the death proportions, cannot be derived from this source. The absence of information on KIAs also detracts from the value of the distributions of casualties among causative agents; however, it is possible to specify accurately the distributions of medically treated WIAs among agents for each type of operation and for each branch of service. These distributions are shown in detail in App C.

It should be mentioned that the distributions of infantry battle casualties show a consistently higher proportion of artillery and mortar casualties than do the distributions from the AG casualty records presented in the next section, with corresponding reductions in the small-arms casualties. This appears to have been due to the fact that most of the superficial wounds were caused by fragments rather than bullets, and, since small arms produced higher proportions of kills* than do artillery and mortars, the omission of KIAs probab'y reduced the representation of agent disproportionately.

* See Table 9.

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Table 2
SUMMARY OF SG CASUALTY DATA

Type of operation	Casualties per division per day	Deaths, percent	Distribution among branches, percent			
			Inf	Arty	Armor	Service
Offensive						
Against main enemy force	68	17	76.1	3.7	9.2	9.1
Against delaying forces						
Organized	28	16	83.2	5.6	4.5	6.7
Partly disorganized	10	19	69.2	9.5	11.1	10.2
Against fortified hill positions	40	15	87.4	3.3	4.0	5.4
Defensive						
Against main enemy force	76	22	73.5	6.6	10.4	9.5
Main pressure on non-US units	40	17	84.2	5.9	3.5	6.4
Withdrawal	65	27	73.1	9.6	6.3	11.0
Positional warfare	8	14	83.4	5.3	3.4	7.9

Table 3
DEATH PERCENTAGES FOR BRANCHES
OF SERVICE
(SG data)

Branch	Average for entire war, percent	Average for non- static periods, percent
Infantry	18	20
Artillery	17	19
Armor	8	8
Service	14	16
All branches	17	19

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DISTRIBUTIONS OF INFANTRY CASUALTIES BY CAUSATIVE AGENT

Introduction

In this section, the distributions of infantry battle casualties among causative agents as estimated from a 10 percent sample of AG casualty records for the period 1 Jul 50 through 31 Aug 52 are presented. Although certain of the over-all conclusions that may be drawn from this data may be obvious, e.g., the predominance of different agents in the various types of operations, the data presented here establish actual magnitudes for these characteristics of the casualty patterns.

The characteristics of AG data as compared with SG data have been discussed previously. It will be recalled that the casualties in the AG sample are those resulting in lost time through some degree of hospitalization. A comparison of causative-agent distributions from AG and SG data indicates that a disproportionately large number of the superficially wounded excluded from the AG sample were caused by artillery. In addition to the above, nonagent-related battle injuries, and MIAs that were not confirmed in either a killed or wounded status by 31 Aug 52, are not included in the sample data.

The accuracy of the information on which these distributions are based is uncertain. Designation of the causative agent was made by the casualty or eye-witnesses and was recorded by the casualty's CO on a form submitted to the division AG. These designations were frequently corroborated by the report of the medical facility at which the casualty received treatment although it is not known whether the information recorded there was based on a physician's examination or the casualty's own statement. In those cases in which there was disagreement between these sources, the information from the medical source was arbitrarily accepted.

Data recorded in the examination of the sample also included, when available, the type of activity in which the casualty was immediately engaged at the time he was wounded. Agent distributions for these various activities have been tabulated for the various types of operations. Unfortunately, the proportions of casualties for whom the type of activity was unknown were quite large in some types of operations. In each of these cases, however, it seems probable that the unknown activity group was composed primarily either of casualties whose actual activity was similar in nature to the type of operation being conducted by the Army as a whole, or was distributed among the known types of activity in the same relative proportion as the activities occurred in the sample. If either assumption is valid, the accuracy of causative-agent distributions for the various types of activity would be unimpaired by the large unknown activity proportions.

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For a given enemy weapons complex, variations in causative-agent distributions are related to the relative frequencies with which personnel are exposed as suitable targets for a particular weapon type, the completeness with which these targets are acquired, and the efficiency and accuracy with which this intelligence is acted on. The latter two steps may be consummated almost simultaneously as in the case of a hand grenade or may involve complex processing of intelligence as with artillery targets of opportunity. Completeness of target intelligence required may vary from practically nil in the employment of mines and booby traps to virtual certainty for the sniper. Different types of operations generate different frequencies of exposure of targets for particular types of weapons and, similarly, the efficiency and accuracy with which the enemy can acquire targets and bring his weapons to bear on them will be different in different operations. An assault on fortified hill positions will result in the exposure of many targets, out of range for small arms, that will be attacked by artillery and mortar barrages if these weapons and ammunition are available. On the other hand, in rapid advances or withdrawals, artillery pieces are overrun or are out of range of the front lines so that casualties must be inflicted by small arms and light mortars. Although the data at hand shed little light on the complex interrelations of the casualty production system, they do provide observations on the end results.

Because of the lack of information, two important factors in causative-agent distributions could not be extensively considered. These are the enemy weapons structure (relative proportions of various types of weapons), and the ammunition supply situation. G2 AFFE has published estimates of the TOEs of the CC Field Army and its subordinate units for different periods of the war (see App A). It is of interest that, although a general expansion of the CCF infantry division was apparent, the ratio between numbers of indirect-fire weapons, including the division slice of army organic artillery, and primary combat troops (defined as members of rifle platoons, reconnaissance units, or machine-gun, rocket-launcher, or recoilless-rifle crews) remained virtually constant at 0.035. If the trend evidenced in these estimates were generally applicable, the influence of weapons structure on agent distributions would be small. In the latter part of the war the artillery of CCF front-line armies was augmented by independent artillery divisions and regiments, a fact that may have affected the data for the periods of static or positional warfare.

Offensive Operations

The distributions of infantry battle casualties among causative agents for the various types of general offensive operations are shown in Table 4. Causative-agent distributions have also been tabulated in terms of the specific type of activity in which the individual was immediately engaged at the time the casualty occurred for each of these types of operations. The latter data are presented in App D.

Data for offensive operations against the main enemy force were drawn from the period between the breakout from the Pusan perimeter to the link-up with X Corps. Although in some phases of this operation movement was rapid, the majority of casualties were sustained in the initial assaults against the NKA at the boundaries of the perimeter. The offensive operations against organized delaying forces consisted of a series of advances, some of which were opposed

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by inferior enemy forces occupying strong positions. These operations followed periods of offense by the enemy, and during them the main body of the enemy was withdrawn to regroup well in the rear of the MLR. Advances were slower than in offensive operations against partly disorganized delaying forces and were conducted according to phase lines. Data for the latter type of operation were drawn from the interval between the link-up of Eighth Army and X Corps after the Pusan perimeter breakout to the beginning of the first CCF major offensive,

Table 4
CAUSATIVE AGENTS OF INFANTRY BATTLE CASUALTIES
IN OFFENSIVE OPERATIONS^a

Type of offensive operation	Causative agents, percent				
	Small arms	Arty and mortar	Hand grenades	Mines and booby traps	Unknown
Against main enemy force	40.8	43.1	6.4	0.7	9.0
Against delaying forces					
Organized	47.5	38.0	7.0	3.6	3.9
Partly disorganized	58.4	25.2	5.4	1.5	9.4
Against fortified hill positions	23.6	64.9	5.9	2.8	2.6

^aData from 10 percent sample of AG casualty records.

and included the rapid advances in North Korea. The data for offensive operations against fortified hill positions were drawn from the limited objective assaults conducted in September and October 1951, primarily in the I Corps sector. The CCF had been maintaining and improving these positions with little contact for more than 2 months. This type of operation might perhaps be classified as a special case of offensive against the main enemy force except that fighting was compartmentalized and against limited objectives. It is probable, however, that data for this type of operation would be indicative of the types of distributions that would apply to casualties sustained in assaults against well-prepared and alerted defenders.

In general it may be observed from Table 4 that the proportion of small-arms casualties increased and those of artillery and mortars decreased as the rate of movement of the MLR increased. The causative-agent data from the Office of the Surgeon General given in App C show the same tendencies, although artillery and mortars caused a generally higher and small arms a smaller proportion of these casualties than was the case for the sample data.

For each of these types of operations, a table showing (a) the distribution of casualties among various types of activity, and (b) the causative-agent distribution of the casualties for each activity is given in App D.

Defensive Operations

The distributions of infantry battle casualties among causative agents for the two types of defensive operations that occurred in the Korean war are shown in Table 5.

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Data for defensive operations against the main enemy force were drawn from the Pusan perimeter defense in 1950. While the NKA, in the early part of the war, applied the main pressure of their offensive against US troops, the CCF, after their initial attacks, chose to direct their offensive operations against ROK units. In these operations some US units were generally called on to block initial penetrations in ROK areas while at the same time other units were maintaining only patrol contact with the enemy. Data from these later periods are included under defensive operations with main pressure on non-US units. In both types of operations the defense was mobile in nature with frequent counterattacks against penetrations.

Table 5

CAUSATIVE AGENTS OF INFANTRY BATTLE CASUALTIES IN DEFENSIVE OPERATIONS^a

Type of defensive operation	Causative agents, percent				
	Small arms	Arty and mortar	Hand grenades	Mines and booby traps	Unknown
Against main enemy force	35.8	37.8	3.6	0.3	22.4
Main pressure on non-US units	41.0	46.3	5.9	2.2	4.6

^aData from 10 percent sample of AG casualty records.

The causative-agent distributions for defensive operations against the main enemy force are characterized by a large proportion of casualties from unknown agents. If casualties from unknown agents are excluded a chi-square test indicates that differences in the relative proportions of casualties from known agents for both types of defensive operations are not significant at the 5 percent level. The weighted average distribution for defensive operations was:

Agents	Percent
Small arms	44.8
Artillery and mortars	48.7
Hand grenades	5.3
Mines and booby traps	1.2

The causative-agent distributions from the SG data, which include the casualties of noninfantry branches, show similar characteristics except that the proportions of fragment casualties are somewhat higher and those of small arms lower than the values for the sample data above.

Tables showing the distribution of casualties among types of activities and the causative-agent distributions for each activity are given in App D for each type of defensive operation. A unique feature was the fact that the proportion of casualties sustained in offensive immediate activity in the periods of general defensive operations was only slightly less than that sustained in defensive activity. This is due to the extensive employment of counterattacks by US units.

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Withdrawal Operations

The distribution of infantry battle casualties among causative agents for withdrawal operations is given in Table 6.

Data for this type of operation were drawn from the two periods of withdrawal under heavy pressure in 1950. The first of these periods was the interval between the entrance of US forces into Korea and the establishment of the Pusan perimeter, and the second followed the entrance of the CCF Army into the war. In the latter period, Eighth Army units had broken contact after 8 days, but troops in X Corps were under heavy pressure until their withdrawal from Hungnam after 30 days of withdrawal operations.

Table 6
CAUSATIVE AGENTS OF INFANTRY
BATTLE CASUALTIES IN WITH-
DRAWAL OPERATIONS^a

Causative agents	Distribution, percent
Small arms	44.7
Artillery and mortars	26.1
Hand grenades	2.4
Mines and booby traps	0.3
Unknown	26.5

^aData from 10 percent sample of AG casualty records.

Despite the uncertainties due to the large proportion of casualties from unknown agents, it appears that small-arms casualties exceeded artillery and mortar losses in this type of operation. This would seem to have resulted from the rapidity of the withdrawal that may have caused enemy artillery to be out of range much of the time.

Among those casualties recorded as having been sustained in an immediate defensive activity, small arms exceeded artillery and mortars, 45.8 percent to 18.1 percent; however, the causative agents for 35.0 percent of these casualties were unknown. Casualties for which the immediate activity was unknown constituted 43.7 percent of all casualties. Their distribution among agents was similar to the average for the withdrawal operations as a whole. Even in withdrawal operations, a sizable proportion (9.4 percent) of the casualties were sustained in offensive activity. They arose primarily in attacks against roadblocks set up by infiltrating enemy troops. Small arms exceeded artillery and mortars as the cause of these casualties, 58.2 percent to 30.9 percent.

Positional Warfare

The period covered by the sample included 11 months that were characterized by a static MLR and positional warfare while truce negotiations were in progress. The period of the sample ended on 31 Aug 52. A total enumeration of all casualties sustained subsequent to that time with respect to causative

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agents and types of immediate activities was made by the Statistical and Accounting Branch, AG (AFFE). Both infantry and noninfantry casualties were included in this enumeration. The causative-agent distribution from the sample data is shown in Table 7, and the enumeration data are presented in the next section.

For the most part, the positions of both sides were well prepared. The causative-agent distributions for the various types of immediate activity in this type of operation may accurately reflect the distributions that would apply to similar activities in offensive or defensive operations with alerted and well-prepared opponents.

Table 7
CAUSATIVE AGENTS OF INFANTRY
BATTLE CASUALTIES IN
POSITIONAL WARFARE^a

Causative agents	Distribution, percent
Small arms	27.4
Artillery and mortars	53.1
Hand grenades	9.5
Mines and booby traps	7.8
Unknown	2.2

^aData from 10 percent sample of AG casualty records.

In this type of operation, offensive immediate-activity casualties were most numerous (33.1 percent of the sample). Their distribution among causative agents was similar to that of offensive-activity casualties in offense against fortified hill positions, except for a slight increase in hand-grenade casualties and a decrease in artillery and mortar casualties. Casualties sustained in defensive activities constituted 16.2 percent of the sample and were distributed 28.4 percent to small arms, 51.4 percent to artillery and mortars, and 15.3 percent to hand grenades.

The second largest proportion of casualties, 20.7 percent of the total, was sustained in patrolling. Small arms were the most frequent cause of these casualties, 41.2 percent, and artillery and mortars, hand grenades, and mines and booby traps accounted for 37.7 percent, 13.0 percent, and 8.1 percent, respectively. Artillery and mortars and mines and booby traps accounted for 60.4 and 35.6 percent, respectively, of casualties in rear-area activities and 51.9 and 20.2 percent, respectively, in maintenance of positions.

Summary

The differences in the extent to which individual causative agents contributed to the casualties in the various types of operations are compared in Table 8. In this table appear the ratio of the percentage for each agent and operation to the unweighted average percentage for that agent for all operations. In the computation of these ratios, casualties from unknown agents have been omitted, and

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the proportions for known agents corrected to total 100 percent for each operation. The unweighted average distribution of casualties among known agents was:

Agent	Percent
Small arms	45.1
Artillery and mortars	48.0
Hand grenades	6.4
Mines and booby traps	2.5

Table 8

RATIO OF FREQUENCY OF CAUSATIVE AGENTS IN EACH TYPE OF OPERATION TO THEIR AVERAGE FOR ALL OPERATIONS

Type of operation	Small arms	Artillery and mortars	Hand grenades	Mines and booby traps
<i>Offensive</i>				
Against main enemy force	0.99	1.03	1.12	0.31
Against delaying forces				
Organized	1.10	0.86	1.16	1.49
Partly disorganized	1.43	0.60	0.95	0.66
Against fortified hill positions	0.54	1.45	0.97	1.14
<i>Defensive</i>				
Against main enemy force	1.02	1.06	0.74	0.15
Main pressure on non-US units	0.95	1.05	0.99	0.92
Withdrawal	1.35	0.77	0.52	0.16
Positional warfare	0.62	1.18	1.55	3.17

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PERCENTAGES OF DEATHS AMONG CASUALTIES FOR DIFFERENT CAUSATIVE AGENTS

Agent-Activity Distributions

In this section, attention is given to the percentages of deaths among total casualties for each causative agent and the manner in which the ratios varied for each agent with changes in the immediate activities of casualties. This information is drawn from a tabulation of all AG (AFFE) casualty records for the period September 1952-July 1953. The type of operation that prevailed during this period was positional warfare. Both infantry and noninfantry casualties were included in this tabulation. The distributions of casualties among causative agents for each type of immediate activity are presented in Table 9.

Table 9
AGENT-ACTIVITY DISTRIBUTIONS FOR POSITIONAL WARFARE^a

Type of immediate activity	Causative-agent distributions, percent					
	Activity representation in data	Small arms	Artillery and mortars	Hand grenades	Mines and booby traps	Unknown
Active offense	15.4	8.2	74.7	13.0	1.1	3.0
Active defense	6.5	27.3	48.4	21.6	—	2.8
Maintenance of position	33.8	5.6	86.1	3.0	1.5	3.8
Patrol activity	11.2	27.3	36.4	22.0	11.1	3.2
Rear area	16.1	3.8	82.0	1.8	7.3	5.1
Unknown	16.0	10.1	62.4	8.4	5.1	14.1
Average		10.3	71.6	8.6	4.0	5.5

^aFor the period September 1952-July 1953.

The increased predominance of artillery and mortars as the causative agent in the latter half of the static MLR period is of interest. Differences in the agent distribution in Table 9 and the sample information for positional warfare for the first half of the static MLR period (Table 8) may be attributed, in part, to the inclusion of noninfantry casualties in the former data. There were also increases in the numbers of independent artillery units supporting the CCF front and in amounts of ammunition available to the CCF.* It is also reasonable to expect that targets were located more precisely as time passed.

* As evidenced by increased incoming rounds counts in this period. (See App A.)

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It is of interest to note that in those types of activity involving infantry personnel almost exclusively—active offense, defense, and patrol activity—reductions in small-arms casualties were accompanied by increases in hand-grenade casualties, indicating an increased tendency toward substitution of these weapons for small arms. This substitution was probably a special feature of the positional-warfare operation, wherein CCF troops might expect to return to their bases for resupply after a few hours of fighting.

Death Percentages

Nineteen percent of all casualties for the period were either KIAs or DOWs. The percentages for the various causative agents were:

Agent	Percent
Small arms	28.4
Artillery and mortars	18.4
Hand grenades	10.8
Mines and booby traps	23.8
Unknown	18.2

It will be recalled that AG casualty records do not include superficially wounded personnel. An estimate of the appropriate percentages for all casualties, however slight, may be obtained by substituting the total WIAs for particular agents from SG data for the WIAs recorded by the AG for the period in question. The resulting percentages were 25.8 and 13.1 for small arms and artillery and mortars, respectively. * Of the WIAs recorded in the SG data the proportions of apparently superficially wounded were 33.5 percent for artillery and mortars and 12.4 percent for small arms.

The manner in which the percentages for each agent varied among casualties sustained in different types of immediate activity is presented as follows. The values shown are based on AG casualty data and, hence, apply only to nonsuperficially wounded personnel.

Small-Arms Casualties

The death percentages for small-arms casualties in the various types of activity are shown in Table 10 together with the number of casualties on which the value was based and the 95 percent confidence limits† of these percentages.

An extreme difference is observed in Table 10 between the percentages in offense and in active defense and patrolling. This may be related to differences in ranges of engagement in these activities, and, at least insofar as active offense and defense are concerned, to varying degrees of exposure to wounding of body extremities. It is also of interest that the activities in which the percentages were highest were those in which immediate medical attention was most difficult to obtain.

* Since hand-grenade and mine and booby-trap casualties are not listed separately by the SG data, no corresponding value can be given for these agents.

† Two points are considered 95 percent confidence limits if they are chosen by a method that if used repeatedly will yield pairs of values that contain the true value in the interval between them in an average of 19 out of 20 applications.

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Artillery and Mortar Casualties

The death percentages for artillery and mortar casualties in various types of activity are shown in Table 11, together with the number of casualties on which these values were based and the 95 percent confidence limits.

The percentages for the various activities appear to have been correlated with the degree to which personnel were shielded in these activities.

Table 10
SMALL-ARMS DEATH PERCENTAGES FOR VARIOUS ACTIVITIES

Type of activity	Casualties	Deaths, percent	95 percent confidence limits	
			Upper	Lower
Active offense	187	15.0	20.1	9.9
Active defense	263	38.4	44.3	32.5
Maintenance of positions	279	23.3	28.3	18.3
Patrolling	453	35.8	40.2	31.4
Rear area	91	18.7	26.7	10.7
Unknown	253	23.7	29.1	18.5
Total or avg	1526	28.4	—	—

Hand-Grenade Casualties

The death percentages for hand-grenade casualties in various types of activities are shown in Table 12, together with the number of casualties on which these values were based and the 95 percent confidence limits.

Little variation from the average is observed in these percentages except in the activities of active offense, in which the proportion was about one-half the average, and in maintenance of positions, in which it was twice the average. The increased individual mobility, together with the fact that such activities were generally conducted in daylight while other activities tended to be conducted at night, may account for the low percentage. No particular reason can be advanced for the high percentage in maintenance of positions; it would be reasonable to expect the proportions in active defense to be at least as high as those for that activity. It is possible that casualties from accidentally detonated booby traps or trip-flare grenades were included in this group and thereby have increased the KIAs.

Mine and Booby-Trap Casualties

The death percentages for mine and booby-trap casualties in various types of activities are shown in Table 13 together with the number of casualties on which these values were based and the 95 percent confidence limits.

These percentages appear to be correlated with the degree of facility with which medical treatment could be made immediately available in the various types of activity.

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Table 11
ARTILLERY AND MORTAR DEATH PERCENTAGES
FOR VARIOUS ACTIVITIES

Type of activity	Casualties	Deaths, percent	95 percent confidence limits	
			Upper	Lower
Active offense	1,703	18.0	19.8	16.2
Active defense	467	25.9	29.9	16.2
Maintenance of positions	1,316	20.4	21.6	19.2
Patrolling	605	15.5	18.4	13.6
Rear area	1,958	15.2	16.8	13.6
Unknown	1,565	16.2	18.0	14.4
Total or avg	10,612	18.4	—	—

Table 12
HAND-GRENADE DEATH PERCENTAGES FOR VARIOUS ACTIVITIES

Type of activity	Casualties	Deaths, percent	95 percent confidence limits	
			Upper	Lower
Active offense	296	5.7	8.3	3.1
Active defense	208	11.5	15.8	7.2
Maintenance of positions	148	20.9	27.5	14.3
Patrolling	365	11.2	14.4	8.0
Rear area	44	9.1	17.6	0.6
Unknown	210	9.5	13.5	5.5
Total or avg	1271	10.8	—	—

Table 13
MINE AND BOOBY-TRAP DEATH PERCENTAGES
FOR VARIOUS ACTIVITIES

Type of activity	Casualties	Deaths, percent	95 percent confidence limits	
			Upper	Lower
Active offense	25	40.0	0.592	0.208
Active defense	0	—	—	—
Maintenance of positions	75	12.0	0.194	0.046
Patrolling	185	24.3	0.305	0.181
Rear area	174	19.5	0.254	0.136
Unknown	129	27.9	0.356	0.202
Total or avg	588	23.8	—	—

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Summary of Death Percentages for the Various Activities

The percentages of deaths among total casualties that were experienced in each type of activity are of interest. It must be borne in mind however, that these are based on the percentages for agents in each context and on the distribution of the casualties of that type of activity among agents, a characteristic peculiar to the particular type of operation. These proportions are shown in Table 14.

Table 14

SUMMARY OF DEATH PERCENTAGES FOR EACH TYPE OF ACTIVITY^a

Type of activity	Casualties	Deaths, percent
Active offense	2280	16.1
Active defense	965	25.9
Maintenance of positions	5010	20.6
Patrolling	1661	21.5
Rear area	2386	15.5
Unknown	2510	17.4

^a Positional-warfare operation.

In general, high percentages in active defense are related to the shielding from minor wounds afforded by defensive positions and difficulties in administering medical care to units pinned down in defense of a position. In active offense, with considerably less shielding, the percentages are quite low.

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CONCLUSIONS AND RECOMMENDATION

CONCLUSIONS

The major conclusions of this study are put forth in the various tables of the main body and its appendices; however, it is appropriate to summarize some of the more significant findings.

1. Casualty rates in withdrawals, defense against the main enemy force, and offense against the main enemy force differed from the WWII average given in FM 101-10¹ by factors of 2, 1.3, and 1.1 respectively.

2. The proportion of KIAs among total casualties in defense against the main enemy force exceeded the proportion in offense against the main enemy force by a factor of 1.7.

3. The proportions of casualties caused by small arms in different types of operations varied from 23.6 percent to 58.4 percent. Higher proportions occurred in those operations in which movement of the MLR was rapid. The proportions caused by artillery and mortars range from 25.2 to 64.9 percent; higher values occurred in those operations in which movement of the MLR was slow.

4. The order in which agents ranked on the basis of the percentage of deaths among total casualties was (a) small arms, 28.4 percent; (b) mines and booby traps, 23.8 percent; (c) artillery and mortars, 18.4 percent; and (d) hand grenades, 10.8 percent. These percentages varied with the types of activity in which the casualties were immediately engaged.

RECOMMENDATION

1. The data presented in this paper constitute useful supplements to the planning data for staff officers in FM 101-10¹ and should be included in revisor of this manual.

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Appendix A

TYPES OF OPERATIONS

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HISTORICAL BACKGROUND

The Korean war began on 25 Jun 50 and ended on 25 Jul 53. During the first year, hostilities were prosecuted intensively by both sides; however, with the initiation of truce negotiations in June 1951, both sides settled down to a long period of relatively static positional warfare. The major interest of this study is centered on the first year of the war.

Except for personnel attached to KMAG, the first US Army troops, a battalion (—) of the 24th Division, entered Korea on 1 Jul 50. The dates of entry of US divisions and independent RCTs were as follows:

24th Division	2 Jul 50
25th Division	14 Jul 50
1st Cavalry Division	18 Jul 50
5th RCT	31 Jul 50
2d Division	3 Aug 50
17th Division	18 Sep 50
187th Airborne RCT	3 Oct 50
3d Division	2 Nov 50

In early 1952, two additional divisions, the 40th and 45th, were added to the US forces in Korea, and at the same time the 1st Cavalry Division was returned to Japan.

For purposes of analysis, the war may be broken down into intervals in which the predominant type of operations for Eighth Army as a whole was one of the following:

- (1) Offensive against the main enemy force
- (2) Offensive against an organized delaying force
- (3) Offensive against a partly disorganized delaying force
- (4) Offensive against fortified hill positions
- (5) Defensive against the main enemy force
- (6) Defensive with main pressure on non-US units
- (7) Withdrawal
- (8) Positional warfare

The intervals of the first year of the war were as follows:

1950

1 Jul-4 Aug, withdrawal and delaying action (type 7).

5 Aug-15 Sep, defense of the Pusan perimeter against heavy enemy pressure (type 5).

16 Sep-30 Sep, breakout from the Pusan perimeter and amphibious operations at Inchon; capture of Seoul (type 1).

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1 Oct-23 Nov, rapid advances against the partly disorganized NKA (type 3).

24 Nov-1 Dec, (Eighth Army) heavy attacks by the CCF.

24 Nov-24 Dec, (X Corps) forced withdrawal of US forces; Eighth Army broke contact on 1 Dec, but X Corps units continued in contact until their evacuation from Hungnam (type 7).

1951

2 Dec-24 Jan, a series of withdrawals, generally with only patrol contact; not studied in detail.

25 Jan-18 Apr, steady advance against inferior CCF delaying forces (main CCF force was withdrawn to regroup well to the rear of the MLR) (type 2).

19 Apr-30 Apr, defense against the first phase of CCF spring offensive; primary pressure on ROK and UN units (type 6).

1 May-15 May, maintenance and improvement of positions with limited contact; not studied in detail.

16 May-23 May, defense against the second phase of CCF spring offensive; primary pressure on ROK units (type 6).

27 May-15 Jun, steady advance against inferior CCF delaying forces to line Wyoming (main enemy force withdrawn to regroup well to the rear) (type 2).

During the remainder of the war, the type of operation is considered to have been positional warfare, except for the period of September and October 1951. In this period US units conducted a series of operations to seize high ground in the area forward of their defense lines. The extent to which individual US divisions participated in sustained operations was quite variable. Although these actions were in a sense offensives against the main enemy force, fighting for individual positions was quite compartmentalized and objectives were limited. It is likely, however, that data on causative agents, if not on casualty rates, from this period may be quite indicative of the distributions that would apply in offensives against a well-prepared and alerted main enemy force.

For those cases in which a particular type of operation predominated in more than one interval, the data for each interval were averaged. Although the intervals for which data were thus aggregated may have varied in some of their details, they were felt to have been sufficiently similar so that their weighted averages are meaningful representations for those types of operations.

THE ENEMY WEAPON STRUCTURE

Two important factors on which data available to this study were scant or nonexistent, were the detailed enemy weapon structure and the ammunition supply levels for each interval. Publications of G2 AFFE give estimates of the TOEs of the CCF Army and subordinate units of two periods. One estimate was considered correct as of the cease-fire, while the second applied to some unspecified earlier period, perhaps as early as 1951, since an ample supply of CCF POWs was obtained following the failure of the second phase of the spring offensive. It is no doubt likely that individual units varied from these TOEs.

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The Chinese Communist Army since 1948 has been evolving from a bandit force to a modern army. This state of transition is also in evidence in the TOEs of the CCF in Korea. In the interval between the periods to which the TOEs applied, the CCF was expanded from a strength of 43,083 to 51,309. It is of great interest, however, that a comparison of total numbers of fragmenting projectile weapons in the CCF (excluding recoilless rifles and rocket launchers) and the total primary combat troops (members of rifle platoons, reconnaissance units, or machine-gun, rocket-launcher, or recoilless-rifle crews) shows that within the Army the expansion was such that the balance between these components remained virtually constant. The TOEs are shown in Tables A1 and A2 for the early part of the war and the cease-fire, respectively. The ratio of fragmenting projectile weapons to primary combat troops at army level was 0.035 in Table A1 and 0.032 in Table A2.

Although similar information on the NKPA in the first half-year of the war could not be obtained, the TOE of one NK division, the 13th, was available.³ Primary combat troops cannot be extracted from total personnel strength; however, the ratio of fragmenting projectile weapons to total personnel was 0.012, and the corresponding values for the CCF divisions were 0.011 in the early part of the war and 0.0105 at the time of the cease-fire.

In addition to the artillery organic to army and its subordinate units, the CCF employed independent artillery divisions and regiments in support of their front-line armies. These units were first listed in the enemy OB of Eighth Army Command Reports in early 1952 and were gradually increased to eight divisions (888 pieces)* and four regiments (144 pieces) by March 1953. If all the pieces accepted as of March 1953 were prorated to the six CCF armies online, the resulting ratio of fragmenting projectile weapons to primary troops is found to be 0.042.

The exact periods during which independent artillery units were present in Korea is difficult to establish, especially since POWs from such units were scarce. The date at which a unit was accepted by OB is significant only as the latest date at which it might have entered in combat. On the other hand it is quite possible that some of the independent units might have become the organic artillery of CCF armies in the expansion of that branch mentioned previously, and, hence, might be counted twice.

The availability of ammunition for these weapons was a subject on which little data could be found; however, total incoming rounds per week, which in 1950 and 1951 fluctuated between 6500 in September 1951 to 12,500 in November 1951, rose to 41,000 in June 1952, and to 131,000 in October 1952.

It is apparent that the major impact of variations in nonorganic artillery and of supply was on the positional-warfare operations.

* Including one KATUSA (RL) Division (108 pieces).

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Table A1
COMPARISON OF FRAGMENTING PROJECTILE WEAPONS AND PRIMARY COMBAT TROOPS
OF THE CCF ARMY IN THE EARLY PART OF WAR

Fragmenting projectile weapons	Army	Division ^a	Regiment ^b	Battalion ^c	Company ^d	Platoon ^e
Artillery						
105-mm How	12	0	0	0	0	0
75-mm gun	24	0	0	0	0	0
75-mm How	36	12	0	0	0	0
70-mm How	36	12	0	0	0	0
Total	108	24	0	0	0	0
Mortars						
120-mm	36	12	4	0	0	0
82-mm	135	45	15	3	0	0
60-mm	183	57	18	6	2	0
Total	351	114	37	9	2	0
Total fragmenting projectile weapons	459	138	37	9	2	0
Primary combat troops	13,146	4,216	1350	420	128	38
Total strength	43,083	12,404	3451	736	167	38

^aThree per army.
^bThree per division.
^cThree per regiment.
^dThree per battalion.
^eThree per company.

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Table A2
COMPARISON OF FRAGMENTING PROJECTILE WEAPONS AND PRIMARY COMBAT TROOPS
OF THE CCF ARMY AT TIME OF CEASE-FIRE

Fragmenting projectile weapons	Army	Division ^a	Regiment ^b	Battalion ^c	Company ^d	Platoon ^e
Artillery						
105-mm How	12	0	0	0	0	0
76.2-mm gun/How	36	12	0	0	0	0
75-mm gun	24	0	0	0	0	0
75-mm How	36	12	0	0	0	0
70-mm How	36	12	4	0	0	0
Total	144	36	4	0	0	0
Mortars						
120-mm	36	12	4	0	0	0
82-mm	81	27	9	3	0	0
60-mm	261	84	27	9	3	0
Total	378	123	40	12	3	0
Total fragmenting projectile weapons	522	159	44	12	3	0
Primary combat troops	16,404	5,302	1712	546	158	48
Total strength	51,309	15,146	3941	874	210	48

^aThree per army.
^bThree per division.
^cThree per regiment.
^dThree per battalion.
^eThree per company.

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Appendix B

BATTLE CASUALTY RATES AND STATUS DISTRIBUTIONS (AG DATA)

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INTRODUCTION

The rates at which battle casualties were sustained by US Army units and the status distributions of these casualties (killed, wounded, and missing) are developed in this appendix for each type of operation of the Korean war. The casualties included are those recorded by the AG (FEC) as shown in "Personnel Statistics,"² and hence exclude superficially wounded personnel. Although a detailed analysis of unit casualties on a short-term basis, such as is given for WWII in FM 101-10,¹ was beyond the limitations of time and readily obtainable data, it is possible to estimate from this information the manner in which casualty rates varied among different types of operations on a long-term basis. In this connection the average casualty rates have been calculated. It should be borne in mind, however, that all divisions did not participate in sustained operations throughout each period for which data are presented, and hence the rates for individual divisions may have varied greatly from the average.

The monthly totals of battle casualties and their status distributions, as reported in "Personnel Statistics,"² are presented in Table B1.

In App A the Korean war was divided into intervals in accordance with the types of operations being conducted by Eighth Army as a whole. These intervals did not coincide with the monthly casualty reporting basis used in Table B1. The number of casualties for each interval may be estimated, however, by allocating the proportions of casualties of those months containing portions of two or more intervals to those intervals on the basis of the casualty treatment rates for the particular interval shown in the SG data.* The total casualties for each interval thus obtained is shown in Table B2 for the first year of the war.

The dates on which US divisions entered Korea have been presented in App A. From these data the numbers of division days in each period have been computed. In these computations, account has been taken of the facts that (a) the 5th RCT functioned as an organic regiment of the 24th Division during 1950 and 1951 replacing a regiment that had become ineffective, (b) the units of X Corps were out of combat from 24 Dec 50 until 25 Jan 51 and (c) the 187th Abn RCT participated in actions for only brief scattered periods after 1950 and was in army reserve after June 1951. An additional modification in strength data must

* The number of casualties allocated to the i th interval of a month containing parts of m intervals is given by the formula

$$(R_{it}/\sum_{j=1}^m R_{jt}) C_k$$

where C_k is the total casualties for the month and R_{it} and R_{jt} are the products of the SG casualty rate for the i th and j th interval in casualties per day and the number of the month's days in the i th and j th interval, respectively.

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be made to account for the fact that those divisions transferred to Korea from Japan were at only two-thirds of authorized strength. In these calculations it is assumed that this condition was corrected, at least so far as combat units were concerned, by early September 1950.

Table B1
TOTAL BATTLE CASUALTIES AND STATUS DISTRIBUTIONS
FOR THE KOREAN WAR--FEC AG STATISTICS

Period	Battle casualties	Category, percent		
		Killed	Wounded	Missing
1950				
Jul	5,949	25.2	42.0	32.7
Aug	5,598	25.0	68.8	6.2
Sep	12,401	20.5	75.0	4.5
Oct	1,335	18.8	75.9	5.3
Nov	8,878	10.8	80.7	38.5
Dec	3,722	9.7	33.9	56.4
1951				
Jan	2,401	21.3	69.6	9.1
Feb	6,506	19.7	62.5	17.8
Mar	4,225	17.5	72.5	10.0
Apr	4,949	13.1	73.7	13.1
May	4,223	16.1	70.6	13.2
Jun	3,374	16.2	80.6	4.1
Jul	1,435	14.3	82.6	3.1
Aug	1,886	21.2	73.5	5.3
Sep	5,179	19.6	77.3	3.1
Oct	8,053	16.1	80.8	3.1
Nov	1,897	21.6	71.1	7.3
Dec	801	21.9	70.7	7.3
1952				
Jan-Mar	1,824	17.6	75.8	6.6
Apr-Jun	3,309	16.9	79.6	2.5
Jul-Sep	3,795	17.6	77.2	5.2
Oct-Dec	5,313	18.5	78.1	3.4
1953				
Jan-Mar	2,559	21.5	75.0	3.5
Apr-Jun	4,389	20.2	77.3	2.5
Jul	3,387	15.6	74.2	10.2

From these data the casualty rates in terms of casualties per division per day have been computed and are shown in Table B3. In these calculations, it has been assumed that casualties to nondivisional personnel were negligible.*

The determination of status distributions for the various types of operations was also complicated by the differences between intervals of the war and casualty tabulation periods. For purposes of estimation of these distributions,

* This assumption is supported by the fact that on 1.7 percent of the casualties in the casualty record sample for the year 1951 discussed in App D were nondivisional troops. This sample, of course, excluded battle injuries; however, the relatively low ratio of "other" to weapon-caused casualties in the SG data indicates that the error introduced is still negligible.

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Table B2
INTERPOLATED CASUALTY TOTALS
(1 Jul 50-30 Jun 51)

Period	Total casualties
1950	
1 Jul-4 Aug	8,320
5 Aug-15 Sep	12,262
16 Sep-30 Sep	5,366
1 Oct-23 Nov	3,918
24 Nov-1 Dec	7,240
2 Dec-30 Dec	2,658
1951	
31 Dec-6 Jan	527
7 Jan-24 Jan	771
25 Jan-18 Apr	14,541
19 Apr-30 Apr	2,361
1 May-15 May	422
16 May-26 May	2,766
27 May-15 Jun	3,734
16 Jun-30 Jun	675

Table B3
CASUALTY RATES FOR VARIOUS TYPES
OF OPERATIONS

Type of operation	Casualties per division per day ^a
Offensive	
Against main enemy force	67
Against delaying force	
Organized	26
Partly disorganized	12
Against fortified hill positions	34
Defensive	
Against main enemy force	77
Main pressure on non-US units	35
Withdrawal	110
Positional warfare	6

^aEquivalent full-strength division days were used for the period 1 Jul 50-1 Sep 50.

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Table B4
STATUS DISTRIBUTIONS FOR VARIOUS TYPES OF OPERATIONS

Type of operation	Months chosen	Category, percent		
		Killed	Wounded	Missing
Active offense				
Against main enemy force	Sep 50 ^a	14.6	83.2	2.3
Against delaying forces				
Organized	Feb, Mar, Jun 51	13.2	89.3	12.2
Partly disorganized	Oct 50	18.8	75.9	5.3
Against fortified hill positions	Sep, Oct 51	17.5	79.4	3.1
Active defense				
Against main enemy force	Aug 50	25.2	88.8	6.2
Main pressure on non-US units	May 51	16.1	70.6	13.2
Withdrawal	Jul, Nov, Dec 50	15.2	44.5	40.2
Static defense	Jul, Aug 51			
	Nov 51-Jul 53	18.6	75.0	6.4

^a As modified in text.

Table B5
COMPARISON OF CASUALTY RATES AND STATUS DISTRIBUTIONS
FOR VARIOUS TYPES OF OPERATIONS WITH WWII AVERAGE¹

Type of operation	Ratios of Korean war data to WWII average			
	Casualties per division per day	Killed	Wounded	Missing
Offensive				
Against main enemy force	1.12	0.85	1.19	0.18
Against delaying forces				
Organized	0.43	1.06	1.00	0.94
Partly disorganized	0.20	1.09	1.09	0.41
Against fortified hill positions	0.57	1.02	1.14	0.24
Defensive				
Against main enemy force	1.26	1.47	0.99	0.48
Main pressure on non-US units	0.58	0.94	1.01	1.00
Withdrawal	1.98	0.88	0.84	3.09
Positional warfare	0.10	1.08	1.08	0.49

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the data from those months during which a single type of operation was clearly predominant have been extracted from Table B1. Data for at least 2 months can be associated with all but one type of operation, i.e., offensive against the main enemy force. This type of operation was predominant in only one period, 15-30 Sep 50. The casualties listed for this month also included many losses in defensive against the main enemy force. An estimate of the status distribution for this type of operation has been calculated on the assumption that the defensive operation casualties for the 1-15 September period has the same status distribution as that which applied in August for the same type of operation. The resulting distributions for each type of operation and the months from which data were drawn are shown in Table B4.

It is of interest to compare the data presented above with corresponding information for WWII as shown in FM 101-10.¹ This source indicated that (a) the average casualty rate for all types of operations for divisions in a combat zone was 10 percent of division strength per month (60 casualties per division per day), and (b) the status distribution of these casualties was 17.2 percent killed, 69.8 percent wounded, and 13.0 percent missing. In Table B5, the ratios of the values for these characteristics to the FM 101-10 values are shown for each type of operation.

It is seen from Table B5 that casualty rates in withdrawal were twice the WWII average and that the average was exceeded also in both offensive and defensive operations against the main enemy force. In other types of operations, the casualty rate ranged from slightly more than one-half down to one-tenth of the WWII average. It is also noted that the proportion of KIAs was highest in defense against the main enemy force and lowest in offense against the main enemy force; and that in comparison with WWII status distributions the proportions of WIAs were generally higher and those of MIAs lower. In the case of withdrawal operations, however, the proportion of MIAs was three times the WWII average.

It should be borne in mind that not all persons included in the MIA category remained permanently in that status. Many persons about whom their units had no information but who were actually KIAs or WIAs may have been included in the MIA category at least temporarily.

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Appendix C

CASUALTIES RECORDED BY MEDICAL FACILITIES

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INTRODUCTION

For each US Army battle casualty who came to the attention of medical facilities in the Korean war, the Office of the Surgeon General, DA, (SG), maintained an IBM card on which the following information was recorded: (a) date of casualty, (b) causative agent, (c) branch of service, and (d) status. A tabulation of these casualty cards was made by the Computing Laboratory, ORO, Washington, the results of which are presented in this appendix.

The SG data discussed here and the AG data discussed in other parts of this study are not strictly comparable. It was AG practice to exclude those superficially wounded personnel who returned to their units after treatment without losing a day's time; SG data include these cases. Medical data, on the other hand, do not include KIAs who did not receive medical attention or MIAs who returned to military control without having been wounded. SG records probably include some casualties carried as MIAs by their units. These discrepancies result in slightly different casualty rates for the different types of operations and proportions of casualties in the KIA category.

A rough estimate of the magnitude of superficially wounded personnel may be obtained by comparing the numbers of WIAs from both sources for the various types of operations. From such a comparison it was seen that the proportion of total SG casualties in the superficially wounded category varied for different types of operations. In offensive against the main enemy force and partly disorganized delaying forces total SG WIAs were less than those in AG data; in other types of operation the superficially wounded appear to have comprised from 5.2 to 30 percent of total SG casualties.

The over-all average was 9.7 percent for all types of operations. In general it can be said that the proportion was higher in those types of operations in which pressure on US units was relatively low or during which the rate of movement of the MLR was small.

It is possible that the variations in the superficially wounded proportion among types of operation may be due in part to a failure of medical facilities to record details on these cases during periods of heavy pressure and perhaps to a disinclination on the part of superficially wounded personnel to leave their units in periods of heavy pressure.

Among those superficially wounded casualties excluded by AG sources, it appears that large proportions were caused by artillery and mortars. The value of the causative-agent data from SG sources is reduced because of the tendency of this source to attribute most of the KIAs recorded to unknown agents; hence the distributions of known agents obtained from this source are based primarily on WIAs. Since the various agents differ in their lethalties, it is possible that, were the causative agents of KIAs known, the resulting distributions would be somewhat altered.

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The categories of causative agents used by the SG were slightly different from those employed elsewhere in this study. For simplicity they have been aggregated into following groups: (a) small arms, (b) artillery and mortars, (c) other fragments, (d) other, and (e) unknown. The other-fragment category includes hand-grenade and mine and booby-trap casualties, whereas the "other" category includes environmental injuries and accidents such as aviation and land transportation.* The casualties in this latter group were omitted from the sample of AG casualties.

SUMMARY OF DATA

A summary of the SG casualty data for each type of operation is given in Table C1. In this table the total casualties and the percentages of deaths among them are shown, together with the percentage distributions of casualties among combat branches of service and among causative agents.

The average percentage of deaths among total medically treated casualties cited in FM 101-10¹ was 0.20. The over-all average in the Korean war as shown in Table C1 was somewhat lower; however, this appears to have been caused primarily by the low incidence of mortality in positional-warfare operations. The average percentage, omitting data from this type of operation, was 18.8. In general, the percentage was higher in defensive and withdrawal operations than in offensive and static defense.

FM 101-10 does not present data on the distributions of medically treated casualties among branches but does show such distributions for AG casualties. These values are compared with the Korean war averages in the accompanying tabulation.

Branch	Casualties, percent	
	FM 101-10 (AG) ^a	Korean war avg (SG)
Infantry	81.9	81.1
Artillery	4.5	5.7
Armor	6.6	5.3
Other	7.0	7.9

^aBased on ETO WWII experience.

The percentages for these two sources are clearly of the same order of magnitude. Among the various types of operations it is seen that the highest percentage of infantry casualties occurred in offensive against fortified hill positions and that the lowest occurred in offensive against partly disorganized delaying forces. The percentage of artillery and of support-branch casualties was highest in withdrawal and the armor casualty percentage was greatest in offense against partly disorganized delaying forces.

The distributions of casualties among causative agents derived from SG data differ from the values obtained from AG records primarily in that the

*Also included were a few casualties attributed to "atomic, biological and chemical warfare," presumably accidents associated with smoke-generating units.

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Table C1
SUMMARY OF SG CASUALTY DATA

Type of operation	Total casualties	Deaths percent	Distribution by branch, percent				Distribution by agent, percent				
			Inf	Arty	Armor	Other	Small arms	Arty and Mort	Other Frag	Other	Unknown
Offensive											
Against main enemy force	5,480	17	76.1	3.7	9.2	9.1	24.1	45.4	4.6	3.8	20.2
Against delaying forces											
Organized	18,356	16	83.2	5.6	4.5	6.7	35.9	42.0	10.4	4.8	7.8
Partly disorganized	3,412	19	69.2	9.5	11.1	10.2	36.4	28.3	7.2	9.9	17.8
Against fortified hill positions	15,285	15	87.4	3.3	4.0	5.4	17.8	57.5	14.8	2.5	7.5
Defensive											
Against main enemy force	12,297	22	73.5	6.6	10.4	9.5	26.9	41.4	4.7	4.9	22.1
Main pressure on non-US units	5,821	17	84.2	5.9	3.5	6.4	29.7	40.8	11.9	4.9	12.6
Withdrawal	10,388	27	73.1	9.6	6.3	11.0	30.4	29.9	4.0	6.8	28.9
Positional warfare	39,101	14	83.4	5.3	3.4	7.9	10.2	62.6	13.6	3.9	9.6
Average, Jul 50-Jul 53	110,140	17	81.1	5.7	5.3	7.9	21.7	50.0	10.6	4.5	13.1

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proportions of casualties for artillery and mortars are higher. This is due in part to the inclusion of superficially wounded personnel and in part to the fact that only infantry casualties were studied among the AG records. The ratio of artillery and mortar to small-arms casualties for the Korean war as a whole from SG data was 2.30 to 1. If casualties sustained in static defense are excluded, this ratio is reduced to 1.54 to 1. The ratio of all fragment casualties to small-arms casualties was 2.79 to 1 for the entire war, and 1.86 to 1 for nonstatic operations. Of the 13.1 percent of the SG casualties sustained from unknown agents, 61.3 percent were KIAs, but among the casualties from known agents 5.8 percent were KIAs. Because of this condition, no estimate of percentages of deaths among total casualties for individual agents can be made. Among the distributions for the various types of operation, a not-unexpected tendency for small-arms casualties to be highest in those operations involving rapid movement of the MLR and for artillery and mortar casualties to be highest in relatively slow-moving operations is observed.

The rates at which casualties were treated by medical facilities for the various types of operation have been computed in a manner similar to that used in App B. In Table C2, the number of casualties treated per division per day is presented. The data in this table are subject to limitations similar to those discussed in App B. Because of what are apparently compensating discrepancies, the casualty rates derived from SG sources do not differ extensively from those obtained from AG records except in withdrawal operations, in which many AG-recorded casualties were MIAs.

CAUSATIVE AGENTS OF WIAs

The distributions of casualties of each branch among causative agents is of interest. Unfortunately the fact that most KIAs were assigned to unknown agents reduces the value of these data somewhat. Because of this, only distributions of WIAs are considered in detail. The causative-agent distributions of WIAs for each type of operation are shown in Tables C3, C4, C5, and C6 for infantry, artillery, armor, and other branches, respectively. In Table C7 the aggregated distribution for all WIAs included in the SG data is presented.

The distributions of WIAs among the various causative agents exhibit differences for the various types of operation. As might be expected, the percentage of small-arms WIAs is highest in those operations in which rapid movement of the MLR occurred, particularly in withdrawal and in offensive against partly disorganized delaying forces, whereas the percentages of artillery and mortar WIAs were largest in operations in which the MLR moved slowly or not at all, such as in offensives against fortified hill positions and positional warfare. This condition is observed in the distributions of WIAs for the various branches as well as for the averages of all branches. For individual types of operations, the percentages of noninfantry WIAs caused by small arms, artillery and mortars, and other fragments show little variation; however, in each type of operation the percentages of infantry WIAs caused by small arms was significantly higher than the small-arms percentages of other branches. The percentages of infantry WIAs caused by artillery and mortars showed no marked

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Table C2
CASUALTIES TREATED PER DIVISION PER DAY
FOR VARIOUS TYPES OF OPERATIONS

Type of operation	Casualties per division per day
Offensive	
Against main enemy force	68
Against delaying forces	
Organized	28
Partly disorganized	10
Against fortified hill positions	40
Defensive	
Against main enemy force	76
Main pressure on non-US units	40
Withdrawal	65
Positional warfare	8

Table C3
CAUSATIVE AGENTS OF WLAs--INFANTRY

Context	Causative agents, percent				
	Small arms	Artillery and mortars	Other fragments	Other	Unknown
Offensive					
Against main enemy force	32.0	55.1	5.5	3.6	3.8
Against delaying forces					
Organized	37.5	44.2	10.4	4.9	3.0
Partly disorganized	44.0	33.6	7.2	11.0	4.2
Against fortified hill positions	19.4	59.2	16.6	2.4	2.4
Defensive					
Against main enemy force	34.5	50.0	5.8	5.2	4.5
Main pressure on non-US units	33.6	44.1	13.0	4.9	4.4
Withdrawal	43.3	39.1	5.7	7.8	4.1
Positional warfare	10.9	66.4	15.6	3.4	3.7
Average, Jul 50-Jul 53	24.4	55.3	12.4	4.3	3.6

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Table C4
CAUSATIVE AGENTS OF WIAs--ARTILLERY

Context	Causative agents, percent				
	Small arms	Artillery and mortars	Other fragments	Other	Unknown
Offensive					
Against main enemy force	16.5	59.1	3.4	15.9	5.1
Against delaying forces					
Organized	24.2	49.7	15.4	8.9	16.8
Partly disorganized	32.1	40.4	10.8	13.6	3.1
Against fortified hill positions	7.4	61.2	21.8	8.5	2.1
Defensive					
Against main enemy force	26.5	58.0	3.0	8.1	4.4
Main pressure on non-US units	23.3	43.7	18.7	9.3	5.0
Withdrawal	34.4	42.3	4.5	13.4	5.4
Positional warfare	4.9	68.9	10.0	10.4	5.8
Average, Jul 50-Jul 53	18.0	56.7	10.4	10.5	4.4

Table C5
CAUSATIVE AGENTS OF WIAs--ARMOR

Context	Causative agents, percent				
	Small arms	Artillery and mortars	Other fragments	Other	Unknown
Offensive					
Against main enemy force	25.0	55.5	7.2	5.3	7.0
Against delaying forces					
Organized	26.7	45.2	15.7	7.5	4.9
Partly disorganized	33.4	35.1	13.3	13.3	4.7
Against fortified hill positions	9.5	63.0	19.6	4.7	3.2
Defensive					
Against main enemy force	28.3	50.7	7.1	8.1	5.7
Main pressure on non-US units	19.7	46.8	20.2	7.4	5.9
Withdrawal	34.7	44.7	4.8	10.9	4.8
Positional warfare	6.0	66.4	13.2	7.4	7.0
Average, Jul 50-Jul 53	21.4	53.5	11.7	7.9	5.6

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Table C6
CAUSATIVE AGENTS OF WIAs—OTHER BRANCHES

Context	Causative agents, percent				
	Small arms	Artillery and mortars	Other fragments	Other	Unknown
Offensive					
Against main enemy force	22.1	58.2	5.7	8.3	5.7
Against delaying forces					
Organized	22.9	48.1	19.0	5.4	4.7
Partly disorganized	38.9	27.4	12.2	15.5	5.9
Against fortified hill positions	10.3	61.9	18.0	4.4	5.4
Defensive					
Against main enemy force	29.1	49.5	7.2	8.7	5.5
Main pressure on non-US units	21.4	45.3	18.7	8.9	5.8
Withdrawal	38.5	41.1	4.8	12.0	5.8
Positional warfare	3.0	66.4	14.8	5.8	7.0
Average, Jul 50-Jul 53	18.2	55.3	13.1	7.3	6.0

Table C7
AVERAGE DISTRIBUTION OF CAUSATIVE AGENTS
OF WIAs FOR ALL BRANCHES

Context	Causative agents, percent				
	Small arms	Artillery and mortars	Other fragments	Other	Unknown
Offensive					
Against main enemy force	29.6	55.7	5.8	4.7	4.4
Against delaying forces					
Organized	35.2	44.6	11.5	5.4	3.2
Partly disorganized	40.9	33.8	8.9	12.0	4.4
Against fortified hill positions	18.0	59.1	16.9	2.8	2.6
Defensive					
Against main enemy force	32.6	50.7	5.9	6.1	4.7
Main pressure on non-US units	31.6	44.3	14.0	5.5	4.6
Withdrawal	40.9	40.0	5.1	9.0	4.5
Positional warfare	10.0	66.5	15.2	4.1	4.2
Average, Jul 50-Jul 53	23.4	55.3	12.3	5.1	3.9

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difference from those of other branches, and the percentages of infantry casualties caused by other and unknown agents were generally lower than those for other branches. Among WIAs from other agents, a category comprised primarily of transportation and environmental injuries, the proportion sustained by artillery personnel was generally higher than those of other branches.

DEATH PERCENTAGES IN DIFFERENT COMBAT BRANCHES

The proportions of total casualties who were either KIAs or DOWs also differed among the branches of service and among types of operations. In Table C8, percentages of deaths among total casualties for each branch and operation, as determined from SG data, are presented.

Table C8
DEATHS AMONG TOTAL CASUALTIES FOR EACH BRANCH
AND TYPE OF OPERATION

Type of operation	Branches, percent				
	Infantry	Artillery	Armor	Other	All branches
Offensive					
Against main enemy force	18	13	7	15	17
Against delaying forces					
Organized	17	19	10	13	16
Partly disorganized	22	20	5	13	19
Against fortified hill positions	16	13	8	10	15
Defensive					
Against main enemy force	24	22	6	18	22
Main pressure on non-US units	18	13	8	12	17
Withdrawal	29	22	11	26	27
Positional warfare	15	13	8	10	14
Average, Jul 50-Jul 53	18	17	8	14	17

Variations of death percentages for different types of operations are, of course, related to differences in the causative-agent distributions. In Table C8 it is seen that infantry casualties generally resulted in the highest percentages, followed by artillery, service branches, and armor casualties in that order. The percentages for armor casualties are extremely low; in fact, they are less than half the average for the casualties of all branches. Since the distributions of armor casualties among causative agents do not appear to deviate markedly from those of other branches, the low percentages cannot be associated with this factor. Possible explanations are that many persons killed in the course of mobile operations did not come to the attention of medical facilities or that large numbers of minor injuries, the secondary effects of causative agents, were included in the SG data.

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Appendix D

CASUALTY RECORD SAMPLE

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MECHANICS OF THE SAMPLE

For each casualty on whom information passed through Hq, AFFE, the AG (AFFE) maintained a record folder that included, among other items, a copy of the casualty report form submitted by the AG of the casualty's division. This form provided space for information on the causative agent and a description of the circumstances under which the casualty was sustained, i.e., the type of activity in which the casualty was engaged when wounded. This information was in turn derived from a feeder form completed by the CO of the casualty's company. To obtain data on distributions of agents and types of activities of battle casualties for each period of the war, a sample of these records was undertaken by ORO (AFFE).

To facilitate recording and tabulation of these data, categories of causative agents and types of activity were established, as follows:

Causative agents—small arms, artillery and mortars, hand grenades, mines and booby traps, unknown.

Immediate activity—active offense, active defense, maintenance of positions (against minor raids or patrols or in the absence of troop contact but excluding defense against attacks aimed at seizing and holding ground), patrol activity, duty in rear combat areas (such as battalion or higher headquarters, reserve areas, etc.), and unknown. Although the desirability of more detailed information was recognized, particularly on causative agents, these categories were in keeping with the level of precision in the reports.

The sample was designed to yield data on approximately 10 percent of the casualties sustained from 1 Jul 50 to 31 Aug 52. Casualty records were stored in footlockers that were segregated into chronologically ordered groups, each group covering a period of from 3 to 6 months.* Within groups, casualties were filed in alphabetic sequence. Ten percent of the footlockers from each group were selected at random; it was assumed that the alphabetical ordering of casualties within footlockers would not detract from the randomness of the sample. The record of each battle casualty in the sample was examined and the date of casualty, branch of service, causative agent, status, and immediate operational context were recorded. These data were then tabulated for the intervals shown in App A.

For the period September 1952 to the end of the war, information similar to the type described above had been placed on IBM cards for all battle casualties by the AG (AFFE) Statistical and Accounting Branch. At the request of ORO (AFFE) a tabulation of these cards was made. Records of 14,812 casualties are included in this group.

*Both battle and nonbattle casualties were intermixed.

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COMPARABILITY OF DATA

Certain of the casualties included in the tabulations of total AG casualties shown in App B were omitted from the sample. Battle injuries that were not the direct effect of enemy weapons were excluded, and personnel carried in MIA status who returned to military control without having sustained a wound were omitted. The primary interest in causative-agent information prompted these decisions. Finally, casualty records on personnel in MIA status or known to be POWs as of 30 Sep 52 were not included in the population from which the sample was drawn. It is possible that information on personnel whose treatment did not require more than a few days may not have been forwarded in some cases and that these data are missing from the sample.

The total casualties listed in FEC "Personnel Statistics"² for the period July 1950-August 1952 were 89,754. The sample, designed to yield 10 percent of the available casualty records, actually produced 6857 or 7.6 percent. Of these sample casualties, 6012 were from the infantry branch. Assuming that the distribution of battle casualties among branches given in FM 101-10¹ can be applied to the Korean war,* 73,509 of the total casualties were infantry and 16,245 were noninfantry. Infantry casualties in the sample were therefore 8.2 percent of total, and noninfantry casualties were 5.2 percent of total. In general the numbers of noninfantry casualties obtained in each interval were insufficient for analysis. Causative-agent and activity distributions have therefore been obtained for infantry casualties only.

SUMMARY OF SAMPLE DATA

The results of the sample of casualty records are presented in Tables D1 to D3. Tables D1 and D2 show, for each interval of the war, the distributions of infantry battle casualties among causative agents and types of activity, respectively. The numbers of casualties in the sample for each interval are also shown. In Table D3, the agent distribution for each type of activity is shown for each type of operation listed in App A. These distributions are averages for those types of operations that prevailed in more than one interval. The numbers of casualties on which each distribution was based are shown. It will be noted that these numbers are quite small for some types of activity; distributions for these activities are presented more for completeness than for their value as estimates.

EFFECTS OF LARGE PROPORTIONS IN THE UNKNOWN TYPE OF ACTIVITY

The proportions of casualties for whom the type of activity was unknown are quite large in some types of operation, particularly those whose distributions were based on data from the first half-year of the war (Table D3 a, c, e, and g). If it could be assumed that the actual types of activity in which the unknown-activity casualties were sustained were either (a) distributed among the

* The validity of this assumption is supported by data presented in App C.

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Table DI
CAUSATIVE AGENTS OF INFANTRY BATTLE CASUALTIES
(1 Jul 50-31 Aug 52)

Period	Operational context	Causative agents, percent					Total casualties in sample
		Small arms	Artillery and mortars	Hand grenades	Land mines and booby traps	Unknown and other	
1950							
1 Jul-4 Aug	Withdrawal	33.8	27.1	0.7	0.3	38.4	292
5 Aug-15 Sep	Perimeter defense	35.8	37.8	5.6	0.3	22.4	685
16 Sep-30 Sep (8A)	Breakout	40.8	43.1	6.4	0.7	9.0	267
16 Sep-30 Sep (X) ^a	Amphibious operation and mopping-up						
1 Oct-23 Nov	Advance—light resistance	31.0	44.8	—	—	24.1	29
24 Nov-1 Dec (8A)	CCF attack and UN withdrawal	62.9	25.2	1.0	1.5	9.1	202
2 Dec-30 Dec (8A)	Strategic withdrawal	55.3	34.1	3.9	—	6.7	179
24 Nov-24 Dec (X) ^a	CCF attack to evacuation of Hungnam	43.3	36.7	3.3	—	16.7	30
1951							
31 Dec 50-6 Jan	Withdrawal—behind screen	56.5	11.3	4.3	0.9	27.0	115
7 Jan-24 Jan	Stable line	47.8	34.8	4.3	—	13.0	23
25 Jan-18 Apr	Advance—moderate resistance	57.8	22.2	6.7	4.4	8.9	45
19 Apr-30 Apr	CCF offensive—phase I	47.9	35.9	7.4	4.5	4.3	950
1 May-15 May	Stable line	40.4	47.6	6.0	3.0	3.0	166
16 May-26 May	CCF offensive—phase II	25.9	63.0	—	3.7	7.4	27
27 May-15 Jun	Advance—moderate resistance	41.4	45.5	5.3	2.0	5.7	244
16 Jun-30 Jun	Stable line	46.2	44.8	5.5	0.7	2.8	290
Jul	Stable line	25.5	59.3	11.8	1.7	1.7	59
		28.7	47.5	13.9	4.9	4.9	122

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Table DI (continued)

Period	Operational context	Causative agents, percent					Total casualties in sample
		Small arms	Artillery and mortars	Hand grenades	Land mines and booby traps	Unknown and other	
Aug Sep	Stable line Limited—objective assaults	36.3	50.3	5.6	3.4	4.5	179
Oct	Limited—objective assaults	27.7	59.7	7.5	3.6	1.4	494
Nov	Stable line	21.5	68.0	5.9	2.3	3.3	824
Dec 1952	Stable line	13.8	67.9	7.5	7.5	3.1	159
		21.1	57.9	7.9	13.2	—	76
Jan	Stable line	40.5	43.2	9.5	6.8	—	74
Feb	Stable line	24.6	44.3	13.1	9.3	8.2	61
Mar	Stable line	29.2	50.0	10.4	10.4	—	48
Apr	Stable line	16.5	56.5	4.7	22.4	—	85
May	Stable line	31.0	48.3	6.9	13.8	—	58
Jun	Stable line	14.2	77.7	5.6	2.0	0.5	197
Jul	Stable line	18.4	63.2	12.2	4.6	0.6	152
Aug	Stable line	19.6	65.2	8.7	5.4	1.1	92

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Table D2
ACTIVITY DISTRIBUTIONS OF INFANTRY BATTLE CASUALTIES
(1 Jul 50-31 Aug 52)

Period	Tactical activity, Percent						Total casualties in sample
	Active offense	Active defense	Passive defense	Patrol	Rear areas	Unknown and other	
1950							
1 Jul-4 Aug	4.8	28.4	6.5	0	5.1	55.2	292
5 Aug-15 Sep	10.9	16.5	8.3	2.0	5.1	58.1	685
16 Sep-30 Sep (8A)	29.6	6.4	2.6	1.5	6.0	53.9	267
16 Sep-30 Sep (X)	44.8	10.3	6.9	10.3	10.3	17.2	29
1 Oct-23 Nov	15.8	17.8	4.5	7.4	6.4	48.0	202
24 Nov-1 Dec (8A)	17.3	25.7	0.6	0.6	2.8	53.1	179
2 Dec-30 Dec (8A)	6.7	23.3	0	0	13.3	56.7	30
24 Nov-24 Dec (X)	8.7	41.7	0.9	1.7	7.0	42.0	115
1951							
31 Dec 50-8 Jan	13.0	52.2	0	0	4.3	30.4	23
7 Jan-24 Jan	8.9	31.1	2.2	13.3	4.4	40.0	45
25 Jan-18 Apr	53.7	11.7	4.5	3.9	7.4	18.9	950
19 Apr-30 Apr	27.1	31.9	4.8	4.2	6.0	25.9	166
1 May-15 May	29.6	18.5	0	25.9	7.4	18.5	27
16 May-26 May	31.1	33.6	4.1	3.7	1.2	26.2	244
27 May-15 Jun	45.2	14.8	5.9	1.4	4.8	27.9	290
16 Jun-30 Jun	57.6	6.8	5.1	8.5	0	22.0	59
Jul	52.5	12.3	0.8	13.9	4.1	16.4	122
Aug	44.7	20.1	8.9	8.4	3.4	14.6	179
Sep	47.2	14.6	8.1	5.3	5.5	19.4	494
Oct	70.8	5.9	4.9	3.3	2.2	13.0	824
Nov	27.7	18.9	18.9	13.8	5.0	15.7	159
Dec	13.2	13.2	14.5	19.8	15.8	23.7	76
1952							
Jan	21.6	9.6	2.7	50.0	6.8	9.5	74
Feb	27.9	13.1	18.4	21.3	13.1	8.2	61
Mar	14.6	10.4	12.6	29.2	18.8	14.6	48
Apr	0	10.6	44.8	25.9	8.2	10.6	85
May	1.7	5.2	31.0	32.8	15.5	13.7	58
Jun	20.3	23.9	37.1	10.2	4.6	4.1	197
Jul	22.4	15.1	32.2	19.1	5.3	5.9	152
Aug	18.5	6.5	42.4	22.2	4.3	5.4	92

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Table D3

AGENT-ACTIVITY DISTRIBUTIONS

Type of activity	Activity representation in sample	Causative agents, percent					Total casualties in sample
		Small arms	Artillery and mortars	Hand grenade	Mines and booby traps	Unknown	
a. For Offensive against Main Enemy Force							
Active offense	29.6	49.4	45.6	1.3	—	3.8	79
Active defense	6.4	58.8	11.8	11.8	—	17.6	17
Passive defense	2.6	28.6	71.4	—	—	—	7
Patrol activity	1.5	75.0	25.0	—	—	—	4
Rear areas	6.0	43.8	56.2	—	—	—	16
Unknown	53.9	33.3	43.7	9.0	1.4	12.5	144
Causative-agent distribution in sample		40.8	43.1	6.4	0.7	9.0	
b. For Offensive against Organized Delaying Forces							
Active offense	51.7	55.4	37.0	5.0	0.1	2.6	617
Active defense	12.4	37.0	31.2	24.0	—	7.8	148
Passive defense	5.1	25.0	58.4	13.4	3.3	—	61
Patrol activity	3.3	53.6	24.4	—	17.1	4.9	39
Rear areas	6.8	23.8	41.7	—	33.3	1.2	81
Unknown	20.7	46.4	41.1	3.2	2.8	6.5	248
Causative-agent distribution in sample		47.5	38.0	7.0	3.6	3.9	
c. For Offensive against Partly Disorganized Delaying Forces							
Active offense	15.8	88.8	25.0	—	3.1	3.1	32
Active defense	17.8	41.7	—	27.8	—	30.6	36
Passive defense	4.5	11.1	88.9	—	—	—	9
Patrol activity	7.4	100.0	—	—	—	—	15
Rear areas	6.4	53.8	30.8	—	15.4	—	13

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Unknown	48.0	59.8	32.0	1.0	—	7.2	97
Causative-agent distribution in sample							
d. For Offensive against Fortified Enemy Hill Positions							
Active offense	61.9	26.1	65.3	5.6	0.6	2.3	916
Active defense	3.2	24.8	62.0	10.7	—	2.5	121
Passive defense	6.1	6.2	90.0	1.3	2.5	—	80
Patrol activity	4.0	45.3	35.8	5.7	11.3	1.9	53
Rear areas	3.4	35.5	28.9	17.8	15.6	2.2	45
Unknown	15.4	20.7	64.0	5.9	4.4	4.9	203
Causative-agent distribution in sample							
e. For Defensive against Main Enemy Force							
Active offense	10.9	36.0	48.0	2.7	—	13.3	75
Active defense	16.5	40.7	21.2	2.7	—	35.4	113
Passive defense	6.3	34.9	53.5	—	—	11.6	43
Patrol activity	2.0	42.9	21.4	28.6	—	7.1	14
Rear areas	5.1	31.4	62.9	—	2.8	2.8	35
Unknown	59.1	34.6	37.3	4.0	6.2	23.9	405
Causative-agent distribution in sample							
f. For Defensive with Main Pressure on Non-US Units							
Active offense	29.5	45.0	51.2	3.3	0.8	1.7	121
Active defense	32.9	43.7	43.0	5.2	0.7	7.4	135
Passive defense	4.4	16.7	61.1	5.6	16.7	—	18
Patrol activity	3.9	50.0	33.3	8.3	8.3	—	16
Rear areas	3.2	15.4	53.8	23.1	7.7	—	13
Unknown	25.1	41.1	43.0	7.5	1.9	3.5	107
Causative-agent distribution in sample							
		41.0	46.3	5.9	2.2	4.6	

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Table D3 (continued)

Type of activity	Activity representation in sample	Causative agents, percent				Total casualties in sample	
		Small arms	Artillery and mortars	Hand grenade	Mine and booby traps		Unknown
g. For Withdrawal							
Active offense	9.4	58.2	30.9	3.6	—	7.3	55
Active defense	30.2	45.8	18.1	1.1	—	35.0	177
Passive defense	3.6	42.9	42.9	—	—	14.3	21
Patrol activity	0.5	66.7	—	33.3	—	—	3
Rear areas	4.8	25.0	60.7	—	3.6	10.7	28
Unknown	51.5	42.0	25.0	2.9	0.3	26.6	312
Causative-agent distribution in sample		44.7	26.1	2.4	0.3	26.5	
h. For Positional Warfare							
Active offense	33.1	27.7	60.7	7.5	1.3	2.8	405
Active defense	16.2	28.4	51.4	15.3	1.3	3.6	198
Passive defense	9.4	19.4	51.9	8.5	20.2	—	115
Patrol activity	20.7	41.2	37.7	13.0	8.1	—	253
Rear Areas	7.3	4.0	60.4	—	35.6	—	89
Unknown	13.3	22.7	57.1	7.4	6.7	6.1	163
Causative-agent distribution in sample		27.4	53.1	9.5	7.8	2.2	

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known types of activity in the relative proportion shown for these types in the sample, or (b) all drawn from a single type, the validity of the agent distributions would be unaffected by these large unknown-activity proportions. The logical choice for the single activity in assumption b would be that activity that most closely resembled the type of operation in question. Whether or not either of these assumptions may reasonably be made for the various types of operation may be indicated, but not proved, by a comparison of the causative-agent distribution of the unknown-activity casualties with the distribution of the single known context in the case of assumption b or the weighted average distribution for all known contexts in the case of assumption a. The statistic employed in this comparison was the chi-square test. Insofar as the major agents (small arms and artillery and mortars) were concerned, the comparisons show that either one or the other of these conditions may appropriately be assumed for each type of operation. Although such evidence is not conclusive, it does support the contention that the accuracies of the agent-activity distributions were not seriously affected by the large proportions in the unknown activity. The types of operations in which assumption a appears valid are those in Table D3 a, c, f, and g.

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