PART TWO

ACCURACY OF ESTIMATES OF VC/NVA STRENGTH, ATTRITION, AND INFILTRATION RATES

INTRODUCTION

The effort in this study to understand the data related to VC/NVA force strength and attrition rates has been only partially successful. During the study it was frequently possible to determine that a given estimate was uncertain but usually the degree of uncertainty could not be established. It is felt that with more time and effort and greater familiarity with available materials and the means by which they have been collected, it would be possible to both gain a better understanding of the uncertainties that must be attached to critical numbers and to narrow the range of the uncertainties.

The difficulties in estimation are the result of several factors. One important fact is that the personnel working with these numbers do not concern themselves with uncertainties. This is not to say that they do not realize that an estimate is uncertain. Quite the converse is true; essentially every person interviewed had an opinion concerning the validity of the estimates. However, no standard methodology exists for estimating errors, and no material was produced to support a given individual's assessment of the magnitude of an error. References were frequently made to the fact that captive statements (derived from POW and defector interrogations or captured documents) supported this or that

estimate. However, such evidence apparently had not been collated and was not available for inspection. Another important consideration is the fact that these individuals work with the figures on a day-to-day basis. The most relevant information in their eyes (and perhaps in fact) is the change in a given estimate. Obviously, those charged with the responsibility for both collection and interpretation of intelligence materials should have an understanding of the degree of precision required for the different purposes for which this material may be used. We doubt that enough attention is being given to this point.

One conclusion of this study is that there are very few major differences in agency and service estimates related to VC/NVA strength and attrition rates. This is primarily a result of the fact that the main source of raw data is MACV. The differences in estimates which do exist result primarily from different interpretations of basic MACV data. In general, MACV's data are accepted for use. This does not connote a uniform belief among all groups that the data are accurate. The general tenor appears to be that there are no better data available, and no way for other agencies to obtain independent estimates at this time. The suspicions that were aroused by the major upward revision in OB by MACV in the spring of 1965 have been replaced by a growing confidence in his figures.

In the following sections, the estimates, their origin (when known), and relevant impressions concerning their accuracy are

discussed. In most cases the opinions expressed are those of agency personnel responsible for review and evaluation of the materials available in each area. They were obtained during discussions with personnel in JCS, DIA, CIA, ACSI, AFNIN, and OASD/SA and from that portion of the available literature which could be studied in the time available. It should be noted that frequently individuals within the same agency would disagree on details, so that it was difficult to ascertain whether any number was "agency position."

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I. VC/NVA ORDER OF BATTLE

The VC/NVA order of battle has been prepared by MACV on a periodic basis since 1962. Important changes in the OB are transmitted as they occur. The intelligence indicators used to verify the presence of units are primarily prisoner of war and defector reports, captured documents, and collateral information. MACV order of battle holdings are classed into the following categories according to the credibility of the available information:

Category 1 - Confirmed by two or more sources.

Category 2 - Groups other than Category 1 derived from captive statements, the major portion of which is confirmed by other sources.

Category 3 - Groups other than 1 and 2, derived from statements of captives who have been interrogated by the Military Interrogation Center or the National Interrogation Center and whose information is probably true but not confirmed by other sources.

Category 4 - Groups derived from other captive statements.

Frequently, the presence of a regular NVA unit is strongly suspected on the basis of a single highly reliable indicator. Increasingly, we are able to pick up units within weeks of their arrival in SVN. If this unit were not engaged, the probability of acquiring POWs or captured documents is small and final confirmati will occur three to six months after the unit has entered SVN. Th would suggest that MACV's order of battle tends to underestimate current enemy strength, particularly in periods of high infiltrati rates and low engagement rates. The basic reason for this state o

affairs seems to be that MACV has adopted conservative confirmation criteria, perhaps to avoid the criticism that enemy strength is overestimated.

The magnitude of the difference between the strength reflected in MACV's OB and the actual current enemy strength is difficult to determine. As stated above, this difference is a function of infiltration and engagement rates. At the end of June 1966, the MACV OB indicated a VC/NVA strength of 101,000. At the same time OACSI, on a less conservative confirmation basis, held an OB having a strength of 117,000. Since that time the difference between these two estimates has decreased and is currently several thousand. The fact that OACSI rarely adds a specific VC/NVA unit to his OB that is not later confirmed by MACV suggests that the criteria for inclusion in MACV's OB are perhaps overly conservative.

The total number of VC/NVA personnel operating in SVN is also estimated by MACV. Main Force strength estimates are based upon information relating to the strength of specific individual units listed in the OB. The strength of the average NVA battalion in SVN is 600 men while the average strength of a VC battalion is 500. Individual battalion strengths, however, vary from 200 to over 800. The strength of a unit carried on the OB is based on the latest information obtained from POW/defector interrogation or captured documents. These figures are updated on a daily basis as new information is received. However, if a VC/NVA unit is not engaged for an extended period, there is little opportunity to obtain this information and the unit strength carried on the OB can be different from the actual strength.

During the month of May 1966, enemy combat unit strength estimates increased from 89,805 to 97,455. Additions and deletions of units to the OB accounted for a net increase of 6,600 while new estimates of strength in units already carried accounted for 1050. Of the 3,880 increase in June 1966, 1400 were due to re-estimates of the strength of units already carried. Projecting this underestimate throughout the entire enemy combat force by assuming that updating of a strength estimate is the result of recent contact wit a unit, it may be concluded that the error in OB resulting from incorrect unit strength estimates amounts to no more than about 15 percent.

In addition to regular combat strength, MACV provides estimate of irregulars (guerrillas), political/military cadres, and administrative/support personnel. Table I is a list of these estimates as of 26 July 1966.

Table 1. VC/NVA FORCE STRENGTH AS OF 26 JULY 1966
(MACV/DIA Estimate)

	Confirmed	Probable	Possible	Total
VC	60,044	1,910	2,150	64,104
NVA[a]	41,360	400	700	42,460
Total	101,404	2,310	2,850	106,564
Irregulars (Guerrillas)			100,000 to 120,000	
Political/Military Cadres			40,000	
Administration and Support			18,000 to 19,000	
Grand Total Communist Force in SVN (7/26/66) = 264,564 to 285,564				

[a]There is evidence of rotation among the NVA infiltrators but as yet no data have indicated a rotation policy by unit.

The guerrilla force figure (100,000 to 120,000) is based on estimates provided by local Vietnamese district chiefs and US/SVN military. This figure has not changed over the past ten months. Information with regard to guerrilla force size is obviously difficult to obtain. Estimates are extremely uncertain because of the variation in guerrilla unit size and even captured guerrillas know little of the size of forces in nearby areas. In conversations with intelligence personnel the largest estimate of current guerrilla force size was 200,000. There appears to be a consensus that the 100,000 listed in Table 1 probably is a lower limit. It was suggested by CIA that there was a reasonable explanation for the constancy of this guerrilla force figure over the last year, namely that the guerrilla forces had been tapped increasingly to fill losses in the VC Main Force ranks. Thus, the build up of the Main Force was at the expense of any build up in the guerrilla force.

The estimate of the number of military/political cadres has remained fixed at about 40,000 since October 1965. This figure is in agreement (to 5 percent) with an estimate contained in a South Vietnamese analysis of the VC political structure dated July 1965. Additional verification of this estimate was not found.

The strength of the administrative/support group can be estimated from studies of captured documents together with current VC/NVA order of battle. At present it is thought to be 18,000 to 19,000 and represents approximately 7 percent of the total communist forces in SVN. This might indicate that the estimate is considered

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accurate to within 1,000. Informal statements made by analysts at CIA indicate they consider the current figure to be an underestimate though they did not indicate by how much. This opinion was said to be based on captive information which shows a larger support/combat personnel ratio than is indicated by MACV's numbers.

For reference purposes, Table 2 is a tabulation of VC/NVA Main Force strength in SVN, as estimated by MACV, from 1960 to the present.

Table 2. VC/NVA FORCE STRENGTH IN SVN

Year	VC	NVA	Total
1960	35,600		35,600
1961	63,400		63,400
1962	79,300		79,300
1963	91,700		91,700
1964	126,000		126,000
1965	215,250 236,250	11,050	226,300- 247,300
1966 (First Quarter)	226,200- 247,200	18,300	244,500- 265,500

II. ATTRITION, INFILTRATION, AND VC RECRUITMENT

A. ATTRITION

MACV prepares, on a regular basis, an estimate of the number of VC/NVA personnel killed in action (KIA) and the number captured. The annual totals reported by MACV from 1959 to the present are shown in Table 3. Since 1964 the number of VC/NVA military defectors have also been reported. In addition to KIA's, capture, and defection, the VC/NVA forces are attrited through desertion, disease, and serious wounds. The total communist permanent military losses are difficult to determine because, although some factors are known to relatively high accuracy (e.g., number captured), other factors must be estimated from little or no information (e.g., losses through disease).

Table 3. VC/NVA KIAs AND CAPTURED
(Annual Totals)

Year	KIA	Captured	Total
1959	1,132	8,038	9,170
1960	5,669	8,097	13,766
1961	12,133	6,252	18,385
1962	21,158	5,700	26,858
1963	20,575	4,307	24,882
1964	16,785	4,157	20,943
1965	35,436	6,277	41,713
1966 (First Half)	25,932	3,587	29,519

The attrition estimates are discussed below according to category.

KIAs

KIA estimates arise from highly heterogeneous sources. The nature of engagements (ground or air, offense or defense, day or night) and their outcome (hold, withdraw, overrun) strongly affect the validity of the estimates.

Since February 1966, MACV KIA estimates have been subdivided into three groups: killed by air (KBA), killed by more than one weapon system (KBMTOWS), and killed by ground forces (KBGF). During the second quarter of 1966, the total VC/NVA KIAs were estimated at 11,872. They were divided among the groups described above as follows:

VC/NVA KIAs DURING SECOND QUARTER 1966

Group	KIAs	Percent Total
KBA	1,773	15
KBMTOWS	139	1
KBGF	9,960	84

The KBA estimates are made by pilots who have not, in general received any special training in this regard. Common practice is estimate the size of the force attacked and percentage of this for killed. Actual body counts from aircraft are, of course, difficul and seldom made. It is the feeling of those familiar with these estimates that they are too high. Some groups totally disregard t

KBA estimates in the KIA totals unless they are verified by other means. It might be mentioned that in several cases when actual verification could be made, the pilots' estimates were said to have been accurate. It should also be noted that for the second quarter of 1966 an error of as much as 50 percent in the KBA estimate would have represented less than a 10 percent error in total KIAs.

The KBMTOWS category prevents duplication in KIA totals when, for example, an enemy unit is simultaneously engaged by both air and ground forces. The group is statistically unimportant in the total attrition figures.

The largest portion of the KIAs are killed by ground forces. KBGF estimates arise almost exclusively from body count. This should provide an accurate figure. It is not uncommon, however, for the body count to consist of estimating the size of the enemy force engaged and estimating the fraction of these killed. Such estimates tend to be inflated, and it is a prevalent opinion that the KBGF estimates are too high. SVN estimates are probably more exaggerated than U.S. estimates. It should be noted that it is not always possible to distinguish VC military from civilian population. Civilian support of VC/NVA military operations is common practice. These personnel, frequently impressed, are used for various purposes including carrying supplies and ammunition and evacuating wounded. In some incidents as many as 80 percent of the fatalities appear to have been nonmilitary. Inclusion of these dead in a KIA report

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could seriously inflate estimates of VC/NVA KIAs. For these reasons, the reported KIAs probably represent an upper limit to the actual military fatalities at the site of the action.

The inflation of the KIA figure is compensated, to some unknown degree, by several factors. The VC place great emphasis on retrieval of dead and a combat unit may be sent forward solely for this purpose. In addition an actual body count could be low because bodies are overlooked and, finally, KIA estimates do not include estimates of the number who subsequently die from wounds. Captured documents indicate that in some cases up to 40 percent of the wounded die during evacuation. This is perhaps an upper limit, but may be reasonable in view of the slow evacuation process, lack of blood and blood substitutes and the assumed limited medical capabilities of the VC. Data from three treatment facilities indicate that 10 percent of those admitted with wounds died. This figure is supported by the statements of a VC doctor who stated that one-third of those admitted with wounds were seriously wounded and that one-third of those seriously wounded died.

Captured

The number of prisoners captured by all friendly forces is reported by MACV and is presumably accurate. The ratio of KIAs to captured has risen from 4 in 1964 to approximately 6 in 1965. During the first half of 1966 one prisoner was captured for every 7 estimated KIAs.

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Defections

The number of VC defections increased from 14,465 in 1964 to 42,552 in 1965. During the first half of this year there have been a total of 9,667 defections. Of these defections only a fraction have been in the enemy military, and it is difficult to determine whether a returnee has served with Main Forces, guerrillas, or neither. This determination is made by South Vietnamese interrogators, and it has been suggested that they are probably lenient in their assessment of a returnee's past involvement in VC activities. Consequently, although the total number of defectors is presumably accurate, the estimate of the number who were military could be low.

The numbers of reported military defectors since 1964 are shown below:

Year	Military Defection	Percent of Total Defection
1964	1,903	13
1965	9,472	22
1966 (through June)	6,735	70

It is interesting to note that while total defection figures indicate a projected decrease in 1966, the military defection figures suggest a military defection increase of almost 50 percent in 1966.

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Desertion

The magnitude of the VC/NVA desertion rate can be estimated from POW/defector interrogation. This process led to a recent intelligence community consensus that the number of deserters is equal to the number of military defectors who return to GVN control. Since that time a preliminary analysis (CIA) of captive information from one VC unit indicates a desertion rate of 25 percent per year and a deserter/defector ratio of 7 during the same period. Such a figure could not be applied throughout the entire VC force; it would, for example, result in an estimate of over 100,000 desertions during 1966. However, this study does indicate that a deserter/defector ratio of one may underestimate the VC/NVA desertion figures. Additional recently acquired captive information supports this conclusion. It was suggested that the ratio might be as high as 20. The paucity of data available makes an analytical estimate of error impossible at this time.

Wounded[1]

The number of VC/NVA wounded in action (WIA) is not independently estimated by MACV, but is computed using MACV's KIA figure and an appropriate WIA/KIA ratio. This ratio has been derived from study of captured medical documents. By analyzing data from 17 documents and agent reports, MACV has determined that the ratio of VC/NVA WIA to KIA in ground engagements is 1.7 to 1. Examination

[1]The implications of available data concerning attrition through KIA, WIA, and illness are discussed in the Appendix.

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of other documents concerning air strikes suggests a ratio of 1 to 1. Combined data from these sources yields a ratio of 1 VC/NVA KIA to 1.5 WIA. A study by CIA, apparently based on the same data, indicates WIA/KIA = 1.62. These two values have been used to establish the upper and lower limits on WIA estimates. The data on which these estimates are based were not studied, but it would be unlikely if they represented a large enough sample of sufficient accuracy to justify the narrow limits indicated by the extremum values. That is, the uncertainty in either number is probably much larger than the difference between them. The GVN WIA/KIA ratio is 5 to 1; the U.S. is 8.5 to 1; and the ROK is 3 to 1. The large variation in these figures is principally a reflection of differences among these forces in the speed and efficiency of treatment and evacuation of wounded.

In order to estimate total permanent military losses, the fraction of WIAs who are seriously wounded must be ascertained. Seriously wounded are defined as those who are out of action for one year or more. Current U.S. estimates are that from one-third to one-half of all WIAs are seriously wounded. Hence, in establishing the upper and lower limits for the seriously wounded category, the national intelligence community uses a multiple of the KIA estimate:

Lower Limit:

$$(\text{KIA}) \times (1.5) \times (0.33) = 0.5 \text{ KIA},$$

Upper Limit:

$$(\text{KIA}) \times (1.62) \times (0.5) = 0.81 \text{ KIA}.$$

Captured documents related to 55 incidents indicate an overall WIA/KIA ratio of 1.2. It is probable that these data, prepared after the engagement, refer to the total killed as KIA. Depending on the size of the sample, these data might suggest that 1.2 is a lower limit to the WIA/KIA ratio.

By including the categories already discussed (KIAs, defectors, deserters, seriously wounded), the intelligence community has estimated communist permanent military losses in South Vietnam. These estimates for the years 1964 and 1965, together with the projection for 1966, are shown in Table 4.

Table 4. ESTIMATED YEARLY COMMUNIST PERMANENT MILITARY LOSSES IN SVN
(Estimated by the Intelligence Community)

Year	Killed	Captured	Returnees	Seriously Wounded[a]	Deserters[b]	Total
1964	16,800	4,150	1,900	8,400 - 13,000	1,900	31,150 - 36,350
1965	36,900	6,300	8,800	18,450 - 29,900	8,800	79,250 - 90,700
1966	48,000	6,000	14,400	24,000 - 38,900	14,400	106,800 - 121,700

[a]Ratio of VC/NVA wounded-in-action to killed-in-action is taken to be between 1.5 and 1.62. Limits on the number seriously wounded are obtained as follows: for lower limit use WIA/KIA = 1.5 and assume one-third of WIA are seriously wounded; for upper limit use WIA/KIA = 1.62 and assume one-half of WIA are seriously wounded.

[b]This estimate is obtained by assuming one communist deserter for each that returns to GVN control.

Disease

Disease has traditionally been the largest casualty producer in any army in any war. Limited data are available regarding VC/NVA attrition through disease although captured documents and POW interrogation indicate that malaria is the most frequently diagnosed illness among VC troops. Also indicated are diarrheal diseases, jaundice, liver diseases, plague, skin diseases, pneumonia, turberculosis, rabies, encephalitis, typhus, and venereal disease. In traveling from the north attrition through disease is commonplace; POWs and defectors have reported as much as 50 percent malaria loss in some units en route from NVN. MACV estimates that the 324 B Division of the NVA which entered SVN through the DMZ this summer suffered almost 10 percent casualties from malaria. The overall fraction of VC/NVA personnel who are unable to carry on military duties because of malaria is probably between 4 and 20 per thousand per day. Although the lower of these extremes would not tax the VC hospital system, a malaria non-effectiveness rate of 20 per thousand, together with a large number of wounded, would require a sizeable medical organization. Analysis of available data has led MACV to estimate that, for all illnesses, 15 per thousand are non-effective (as a daily average). Enemy documents state that 71 percent of the sick are returned to duty. On this basis ACSI has estimated that possible enemy losses through illness in 1965 was 8,700.

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B. INFILTRATION

Estimates of the VC/NVA infiltration effort is obtained from POW interrogation, captured documents, and other means. Table 5 lists the estimated annual infiltration (all categories) since 1959. Over the past few years the estimated monthly infiltration rate has doubled each year (from 1000/mo. in 1964 to 2000/mo. in 1965, 4000/mo. during the first 5 months of 1966). It is the unofficial opinion of analysts at CIA that MACV's reported monthly infiltration rates are conservative. They estimate that the infiltration rate is actually between 5 and 10 percent higher than the MACV estimates. ACSI believes that the discrepancy is larger and that MACV's estimate may be low by a factor of two. It would, therefore, appear that the MACV infiltration figures are underestimates, possibly resulting from use of the same overly conservative criteria applied in making OB estimates.

It is generally assumed that the infiltration effort is entirely by foot, along the Ho Chi Minh Trail network in the eastern half of the Laotian panhandle. The route of infiltration skirts the edge of the DMZ, turns south to the vicinity of Ban Dong, and then continues south between Routes 92-96 and the Laos-Vietnam border. The southern terminus is at least as far south as the tri-country area. At intervals along this north-south route trails branch eastward toward Vietnam. Way-stations are located along the route up to a few days' march apart and are used to house liaison personnel, provide resupply for infiltrators, and serve as recovery areas for those suffering from some debilitation.

Table 5. VC/NVA INFILTRATION INTO SVN

Year	Category[a] 1 and 2	Category[a] 3 and 4	Total
1959-1960	4,556	26	4,582
1961	4,118	2,177	6,295
1962	5,362	7,495	12,857
1963	4,726	3,180	7,906
1964	9,316	3,108	12,424
1965	19,253	4,893	24,146
1966 (Through May)	8,300	11,395	19,695

[a]Categories defined on Page 4.

Liaison personnel accompany the infiltration groups from one way-station to another. There is possibly a 10 percent permanent loss in personnel en route due to injury or disease, principally malaria. The infiltrators travel in groups of from 25 to 200 (even though whole units are moving down simultaneously), and the journey requires from several weeks to a few months--depending on destination and weather conditions.

The possibility of truck transport has also been suspected, but no captured POW has ever admitted traveling by truck. Although there are no physical reasons preventing such transport, it can be argued that trucks are more urgently needed to carry supplies.

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In order to have a substantial effect on infiltration rates the effort to transport personnel south on trucks need not be great. CIA estimates that four out of every 32 trucks entering Laos daily during the last dry season carried personnel (probably construction personnel). This represents a flow of approximately 100 persons per day. The maximum predicted infiltration rate into South Vietnam for 1966 is approximately 6000 per month--or 200 per day.

C. VC RECRUITMENT

There is no formal methodology by which VC recruitment in South Vietnam can be reliably estimated. Apparently because of the loosely structured organization, information from captive sources is of limited value in this regard. Consequently, VC recruitment estimates are extremely unreliable. One can attempt to obtain this figure by subtracting the estimated VC/NVA infiltration rate from the net increase in estimated VC/NVA strength for a given period. OASD/Systems Analysis has attempted to do this on a monthly basis using available MACV data. The results are highly questionable (recruitment rates during some months are negative). If, however, the errors and past inaccuracies in MACV's estimates can be corrected, such a procedure could provide valuable retrospect. Current intelligence estimates suggest that recruitment rates of 3000-4000 per month are well within the VC capabilities.

There is some indication of possible manpower constraints in the VC controlled areas. There has been more drafting of personnel

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and less of the careful selection which characterized previous recruitment. The increasing use of a draft is apparently causing dissatisfaction.

III. MANPOWER

There are no major disagreements between agencies or Services in estimates related to manpower available in North Vietnam. The current intelligence community estimates are summarized in Table 6. Approximately 175,000 North Vietnamese males reach age 15 each year In estimates, it is considered reasonable to assume that 100,000 of these are fit for military service and could be trained for infiltration annually. This figure could be increased for a short period (to possibly as much as 200,000) by widening the manpower base and shortening the length of training.

Table 6. NORTH VIETNAMESE MANPOWER SUMMARY

Total Population	18 Million
Male Population aged 15-49	4-4.5 Million
Domestic Labor Force (from males, aged 15-49)	2.4 Million
Armed Forces	0.38-0.47 Million
Army	350,000 - 425,000

In South Vietnam it is assumed that the VC recruit from the male population aged 15 to 49 years in VC-dominated areas. MACV estimates VC control of 25 percent of the rural population. This provides a base of approximately 430,000 for VC recruitment. VC recruitment capabilities are estimated by the intelligence communit at two battalions plus 2500 replacements per month during 1966.

Total VC/NVA reinforcement rate capability is estimated to be 16 battalion-equivalents per month during 1966.

IV. SUMMARY AND CONCLUSIONS

In summary, this study would indicate that the following comments could be made concerning the accuracy of the estimates made by MACV:

a. Main Force OB - underestimates current strength by perhaps 15 percent. Lags behind actual strength; time lag variable.

b. Number of Guerrillas - uncertain by less than a factor of two. Probably conservative.

c. Number of Support/Admin. Personnel - underestimated by less than a factor of two.

d. Number of Political/Military Cadres - uncertain by unknown factor.

e. KIAs - overestimated, magnitude of overestimate uncertain

f. Number captured - accurate.

g. Number of defections - accurate.

h. Number of desertions - underestimated, perhaps up to a factor of five.

i. Seriously wounded - not estimated by MACV, intelligence estimates uncertain by unknown factors.

j. Lost through disease - not estimated by MACV, intelligenc estimates uncertain by unknown factor.

k. Infiltration - underestimated by MACV, accuracy uncertain

l. VC Recruitment - uncertain by unknown factor.

Several conclusions were drawn concerning the estimates which appear to be significant in establishing uncertainties:

1. There are only a few disagreements between the agencies and Services in estimates of VC/NVA force strengths, infiltration rates and attrition. This results primarily from the fact that essentiall all raw data are provided by MACV.

2. Disagreements in estimates of VC/NVA force strengths, infiltration rates and attrition rates which do exist arise primarily from different interpretations and treatments of MACV's data. Examples are: (1) the use of different WIA/KIA ratios; (2) differen confirmation criteria for the presence of VC/NVA units in SVN; and (3) acceptance or non-acceptance of the killed-by-air estimates in the total KIA figures.

3. MACV estimates of the number captured and the number of defectors are considered accurate. Several other MACV figures such as area and population control estimates are also considered to be of reasonable accuracy.

4. MACV's estimates in the areas of VC/NVA strength, attrition infiltration, and recruitment are soft to varying degrees. Precise measures of uncertainty could not be determined for any estimate.

5. There is a tendency for MACV to take a conservative position with regard to most estimates. For example, the OB prepared by MACV underestimates current VC/NVA strength during periods of enemy buildup. Confirmation (by MACV) of the presence of VC/NVA units in SVN occurs between 3 and 6 months after actual arrival.

6. No well-established continuing program exists to correct and study past errors in MACV estimates. Such corrections are essential if these estimates are to be used, for example, in calculating rates of change. Important inferences might be altered as a result of reassessing the corrected data. CIA reports that recently MACV has undertaken the task of reanalyzing past estimates. The degree to which this has been accomplished was not established.

7. Further study of the methods by which the estimates are prepared could result in a more accurate assessment of their uncertainty.

APPENDIX

IMPLICATIONS OF AVAILABLE DATA CONCERNING ATTRITION THROUGH KIA, WIA, AND ILLNESS

A. It is interesting to consider the inferences which can be drawn from the limited data available concerning the magnitude of losses suffered in an action and during subsequent evacuation and treatment at hospitals. In order to simplify the discussion it is convenient to define, in a specific fashion, several quantities:

KIA: The number of dead at the site of action.

WIA: The number wounded at the site of action.

D_T : The number of WIAs who die during evacuation from the site of action.

W_A : The number of WIAs who reach a field hospital for treatment by medical personnel. (Hence, WIA = $D_T + W_A$)

D_H : The number of WIAs who die in hospital.

W_H : The number of wounded who survive hospital treatment and either return to action or are permanently disabled. (Hence, $W_A = D_H + W_H$)

W_S : The number of WIAs who are seriously wounded (lost for one year or more).

The following limited information mathematically relates these quantities:

(1) A captured VC officer's handbook and documents captured from a VC medical facility suggest that 25% to 40% of the WIAs die during evacuation.

Hence: $D_T = (0.25 \text{ to } 0.40)$ WIA

(2) Records show that 23 of 940 VC died following admission to hospitals.

Hence: $D_H = 0.024\ W_A$

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(3) Documents from two sources indicate that 77 to 73% of those treated in hospitals return to their units. The remainder were disabled or evacuated to other facilities. Assuming these are all seriously wounded;

$$W_S = (1-0.77)\ W_A = 0.23W_A$$

(4) Data covering 55 air and ground engagements indicate an overall ratio of 1.2 wounded for each one killed. This is probably a retrospective figure and, if so, those who died of wounds are included in the killed category. Hence, assuming all the wounded who survive reach a hospital;

$$1.2 = \frac{W_H}{KIA+D_T+D_H}$$

Using these data, the total losses can be related to the KIA estimate:

From (1):

$$D_T = (0.25 \text{ to } 0.40)\ WIA$$
$$= (0.25 \text{ to } 0.40)(D_T+D_H+W_H)$$
$$D_T = (1/3 \text{ to } 2/3)(D_H+W_H)$$

From (2):

$$D_H = (0.024)(D_H+W_H) \quad \text{or} \quad D_H = 0.025W_H$$

From (3):

$$W_S + D_H = 0.23\ (D_H+W_H) \quad \text{or} \quad W_S = 0.21W_H$$

Hence, from (4):

$$W_H = 1.2\ [\ (KIA + (1/3 \text{ or } 2/3)(D_H+W_H) + 0.025W_H\ ]$$
$$= 1.2\ [KIA + (1/3 \text{ or } 2/3)\ 1.025W_H + 0.025W_H\ ]$$

or $W_H \simeq$ (2 to 6) KIA

$W_S \simeq$ (0.4 to 1.3) KIA

$D_H \simeq$ (0.05 to 0.15) KIA

$D_T \simeq$ (0.7 to 4.1) KIA

Total permanent losses, T, as a result of an action are:

$$T = KIA + D_T + D_H + W_S$$

$$= [\ 1 + (1/3 \text{ to } 2/3)(D_H+W_H) + 0.21W_H + 0.025W_H\ ]\ KIA$$

$$= (2.1 \text{ to } 6.4)\ KIA$$

The WIA/KIA ratio (at the site of action) is:

$$\frac{WIA}{KIA} = \frac{D_T + D_H + W_H}{KIA}$$

$$= \frac{[(0.7 \text{ to } 4.1) + (0.05 \text{ to } 0.15) + (2 \text{ to } 6)\ ]\ KIA}{KIA}$$

$$= 2.75 \text{ to } 10.25$$

B. As previously stated, other captured information from 3 VC treatment facilities indicate that approximately 10% of the wounded who were admitted subsequently died or were permanently incapacitated. That is, $W_S + D_H = 0.10(D_H+W_H)$. This information was supported by the statements of a VC doctor. If, as above, it is assumed that the death rate during evacuation was 25% to 40%, the total permanent losses become:

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$$T = KIA + (0.25 \text{ to } 0.40)\ WIA + 0.1\ [\ 1-(.25 \text{ to } 0.40)\ ]\ WIA$$

Using a WIA/KIA ratio of 1.5;

$$T = \{\ 1 + (0.25 \text{ to } 0.4)\ 1.5 + 0.1\ [\ 1-(0.25 \text{ to } 0.4)\ ]\ 1.5\ \}\ KIA$$

$$\simeq (1.5 \text{ to } 1.7)\ KIA$$

In this case (i.e., WIA/KIA = 1.5), the retrospective ratio of wounded to killed would be

$$\left(\frac{WIA}{KIA}\right)_{(\text{retrospective})} = \frac{WIA - (0.25 \text{ to } 0.4)\ WIA - D_H}{KIA + (0.25 \text{ to } 0.4)\ WIA + D_H}$$

$$= \frac{[\ 1.5 - (0.25 \text{ to } 0.40)\ ]\ KIA - D_H}{[\ 1 + (0.25 \text{ to } 0.40)\ ]\ KIA + D_H}$$

$$\simeq 0.8 \text{ (if no deaths occur in hospital)}$$

$$\simeq 0.6 \text{ (if all permanent losses from hospital are the result of death)}$$

If instead of using MACV's WIA/KIA ratio, one satsified the requirement that the retrospective value of WIA/KIA be 1.2, the following obtains:

$$\frac{WIA - (0.25 \text{ to } 0.4)\ WIA - D_H}{KIA + (0.25 \text{ to } 0.4)\ WIA + D_H} = 1.2,$$

or, at the site of action:

$$\frac{WIA}{KIA} \simeq 2.5 \text{ to } 5.5$$

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C. Records of hospitalization of 52 wounded VC personnel show that each was in a non-duty status for an average of about 26 days. Projecting this figure throughout the VC/NVA force by assuming MACV's KIA estimate for 1965 and using WIA/KIA = 1.5, one would conclude that, on the average, at any time in 1965 there were approximately 3,300 VC/NVA wounded in non-duty status. If, on the other hand, the data presented previously are used and it is assumed that all personnel admitted to hospitals remain on non-duty status for 26 days, the average during 1965 would have been:

$$\frac{(D_H+W_H)\ 26}{365} = \frac{(2.05 \text{ to } 6.15)\ 26}{365} \quad \text{KIA}$$

$$= \left(\frac{36{,}900}{365}\right) (2.05 \text{ to } 6.15)\ 26$$

$$\simeq \quad 6{,}000 \text{ to } 18{,}000$$

The results of these elementary calculations, although based on a limited amount of information, demonstrate the sensitivity of attrition figures to the value of specific estimates. For example in order to obtain reliable estimates, it is obviously important to know accurately the WIA/KIA ratio and the number of WIA who subsequently die of wounds. Most important perhaps is gaining a reliable estimate of KIA. The implications of an inflated KIA estimate are apparent; any error in KIA is propogated throughout all estimates of attrition resulting from action.